THE EXTRA PHARMACOPŒIA

MARTINDALE
AND
WESTCOTT

VOL. I

EIGHTEENTH EDITION

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THE

EXTRA PHARMACOPŒIA

OF

Martindale and Westcott

REVISED

BY

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EIGHTEENTH EDITION.

IN TWO VOLUMES.

VOL. I.

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VOLUME I.
TABLE OF CONTENTS.

	PAGE
Preface to the Eighteenth Edition	iv
Abbreviations	xxv
Weights and Measures	xxx
Metric Weights and Measures and their Equivalents	xxxii
Approximate Equivalent Doses	xxxiii
Percentage and Grains per Fluid Ounce Equivalents	xxxiv
Neutralisation Table	xxxiv
Arithmetical Memoranda	xxxiv
Thermometric Equivalents	xxxvi
„ „ within Clinical Limits	xxxvii
International Atomic Weights	xxxviii
Materia Medica, Official and Non-Official, alphabetically arranged	1–803
Supplementary List of Drugs	804–868
Vaccines and Antitoxins	868–943
Animal Organotherapy	944–974
Blood Transfusion	975
Table of Infectious Diseases	976
Poisons	977
Schedule of Poisons	978–979
Orders in Council *re* Mineral Acids, Disinfectants, and Agricultural and Horticultural Poisons	979–980
Wholesale Trading	980
Sale of Arsenic	981
Proposed Additions (Aug., 1924) to Poisons Schedule	981
Sale of Poisons in Ireland	982
Dangerous Drugs Act, 1920, and Statutory Rules and Orders	983–991
Dangerous Drugs and Poisons (Amendment) Act, 1923	991
Amendment as to Dealings in [P1] Poisons	992
Draft 'Labelling of Poisons Order, 1924'	993
Points of Assistance regarding the Acts	994–995
Calculation Tables relative to the Acts	996–998
Examples of [℞] Prescriptions	999–1001
Example of 'Signed Order' under the Acts	1001
Venereal Diseases Act, 1917	1002
Dentists Act, 1921	1002
Trade Marks and Patents Legislation	1003–1004
Therapeutic Index of Diseases and Symptoms	1005–1062
Antidotes to Poisons	1063–1067
Proportional Dose Table (according to age)	1068
Intravenous Doses, Table of	1069–1070
Index and Posological Table	1071

PREFACE.

Since the issue of our last edition of Volume I. of THE EXTRA PHARMACOPŒIA, in July 1920, painstaking research of divers kinds has been conducted, both in purely chemical subjects and in physiological chemistry, and many advances in medicinal treatment have been made as fruit of these investigations.

Before proceeding to a review of the new matter in our pages, it is a pleasant duty to mention references to new works which have appeared during the last few years.

Supplements dated 1920 and 1922, have appeared to the FRENCH CODEX; a fourth edition of the ITALIAN PHARMACOPŒIA (1920); a fourth edition of the JAPANESE PHARMACOPŒIA (official as from 1921); a second edition of the ARGENTINE PHARMACOPŒIA (1919—official as from January, 1923), as also numerous editions of Hospital Pharmacopœias of this country and a number of standard text-books and treatises (see Abbreviations). Alterations in our pages have been necessary to bring the information into line with changes in these. These amendments have been made with due acknowledgment.

A most drastic wielding of the blue pencil has been exercised upon the matter embodied in our last issue, with a view to keeping down the bulk of the book, but owing to the multitudinous subjects which we describe and the provision of some thousands of abstracts from a somewhat extensive literature of recent Scientific Journals, the volume contains more pages than the last edition.

A brief résumé of the new chemicals and drugs, and new methods of employing older remedies, together with relevant matters, now embodied, may be of interest.

Acid Salicylic.—The acetylation of this valuable chemical resulted, some twenty-five years ago, in the introduction of the even more useful compound, Aspirin. This substance, being relatively insoluble in water, chemists turned their attention to making the various alkali and alkaline earth salts, *e.g.*, the Sodium, Calcium and Magnesium salts, which possess far greater solubilities and, in consequence, it may be argued, more prompt effect as antipyretic, antirheumatic and antineuralgic remedies.

Considerable credit is, we think, due to the medical man who, like the late Lovell Drage, might be said to have the "true spirit of the investigating physician," and who found the intravenous injection both of the Calcium salt and the Sodium salt effective in relieving rheumatic and other types of pain (see p. 91). Experiments *in vitro* showed that while the Sodium salt is more readily miscible with blood serum without causing precipitation, nevertheless clinically, the Calcium salt seems more efficacious, *e.g.*, in treating the sensory symptoms of tabes and in the relief of the pain of iritis.

We have recently experimented upon the halogen substitution compounds of Aspirin. **Acetyl-Iodo-Salicylic Acid (Aspriodine)** is a definite stable chemical compound, containing 58·53% Aspirin and 41.47% Iodine, and is suggested for use where the combined effect of the molecular constituents may be of value.

The important factor connected with the compound as a therapeutic agent, which the writer proved by experiments on himself, is that the Iodine is split off in the system and appears in the urine within an hour of taking a dose.

It may be mentioned, in passing, that halogen in the Benzol ring in aromatic compounds is generally strongly held and not capable of being split off, *e.g.*, by treatment with aqueous alkali—the observation in this instance is therefore of interest. The effect is doubtless due to enzyme action working in conjunction with the alkalinity of the digestive fluid of the duodenum.

As further steps, numerous salts of Aspriodine have been made, *e.g.*, those of Sodium, Lithium, Calcium and Magnesium. While the parent acid has been described in the literature, and was indeed the subject of a patent in Germany, these salts are new to medicine, and, it is probable, will be proved even more effective ; they may be suitable for hypodermic or intravenous injection. At the time of writing, it remains for us to determine the dosage of these also by trials upon ourselves, as there are no means readily available for animal experiments in this country. For the present, we are resting on the acid as a useful chemical.

As to the Bromine analogue (**Sedasprin**), this substance is new to therapy. It was briefly referred to in the English chemical literature from the purely chemical standpoint a few years ago. It contains 69·14% Aspirin and 30·86% Bromine. The combination of Aspirin with the sedative Bromide effect has proved of service in medicine. Here, again, it was necessary to determine dosage by experiments upon ourselves, and we are indebted to numerous laboratory assistants for placing themselves under treatment with Sedasprin, to determine what happens to the Bromine radical in the human body.

The investigation developed into quite a thesis. Very little appears in the general literature on the fate of Bromine quantitatively, even under doses of ordinary inorganic Bromides, and still less is to be found in respect of organic compounds.

We, therefore, attacked the problem, first by examining the urine after doses of Potassium Bromide, then by making experiments with Adalin and finally proceeding to Sedasprin. (Quite incidentally, the writer did similar work for Sir William Gowers a good many years ago in respect of Brominol, with similar findings.)

To the chemist, it is of interest that Bromine in such compounds does not behave similarly to Iodine, *i.e.*, it is by no means easy to find Bromine eliminated from Bromides, whether organic or inorganic. Text-books indicate that Bromine is very slowly eliminated in such a case—indeed, the general conclusion is that the Bromine passes into the blood and thence into the nervous system.

In other words, our failure to find more than traces of Bromine in the excreta is evidence that the Bromine is absorbed.

Various salts of Sedasprin have also been made, *e.g.*, the Sodium, Lithium, Calcium and Magnesium compounds. These also stand over for the moment, while the results of our experiments on the parent acid make it a useful addition to therapy.

The ramifications in chemistry—we are writing for the moment to appeal rather to our medical readers than to our chemical confrères—permit of many possibilities in synthesis. To be brief, our next step was the preparation both of **Phenyl-Aspriodine (Acetyl-Iodo-Salol)**, and **Phenyl-Sedasprin (Acetyl-Bromo-Salol)**. Compounds of this type should obviously prove of interest to supersede Salol, just as Phenyl-Aspirin should supersede ordinary Phenyl Salicylate.

The therapeutic claims for the last mentioned compounds are given in the body of the book. It may be mentioned, in passing, that the doses in each instance are limited by their Phenol content; care is therefore necessary.

Acidum Sulphurosum.—A note is provided under Sodium Hyposulphite of its recent intravenous use in combating Arsenical poisoning as a result of Arsenobenzol medication.

Alcohol Isopropylicum.—There are two types of this compound (to be carefully distinguished from the normal Propyl Alcohol), namely, that made on synthetic lines and the variety obtained as a by-product in the Petroleum industry. We point out the various distinctive qualities of the synthetic Alcohol as being the purer of the two. The Petrol product of commerce has distinct Petrol odour and taste. The pharmacology of the pure article is given, and it is shown to be safe internally in small doses in a dilute form. Externally, it is also harmless to the skin and hair.

Taking into consideration the high price of Duty-paid Ethyl Alcohol, it is a little remarkable that Isopropyl Alcohol has been relatively little used. We have conducted a number of experiments on Tinctures and Spirits of Official drugs, using the Isopropyl instead of Ethyl Alcohol as the extracting or solvent medium, and have determined that the qualities of Isopropyl Alcohol are quite suitable to replace Ethyl Alcohol. We provide the extractive yields in a comparative table. This little pioneer effort (carried out by one of our employees under our direction) we venture to bring to the attention of the compilers of the British Pharmacopœia. Personally, we see no reason why Isopropyl Tinctures and Spirits should not receive recognition, especially in making preparations inadmissible for rebate.

Alkaloidal Notes.—Under this heading we provide, what we believe to be, a little logical reasoning on the subject of "Activated" Alkaloids. The idea of using alkaloidal bases instead of their salts seemed to fit in clinically, with the frequently reiterated statement as to the enhanced action of alkaloids in presence of alkalis Here, also, we attacked the problem at the laboratory bench. We

found that a Cocaine Hydrochloride solution, with added Sodium Bicarbonate (which we had been informed was remarkably anæsthetic) contains a portion of its Cocaine in the basic condition and the rest of it, probably, in a labile equilibrium state. This being the case, it became a question whether *minute* doses of divers alkaloidal *bases* could not be presented for therapeutic use in solutions (made as permanent as possible) to produce an effect equal to (far larger) ordinary therapeutic doses of these alkaloids. Various suitable solvents were tried and the solubilities of the alkaloids are indicated. We were fortunate in securing the interest of two independent authorities, who have submitted some of the solutions to trial in London Hospitals. The results are very interesting, showing, *e.g.*, that such a minute amount as 1/160 grain of Morphine in this form, has efficacy. The utility of alkaloidal base preparations is evident from what we have said. To produce even a relatively transient effect with these preparations is a gain over the " large " doses of the salts hitherto employed. There may be a field for them as yet untried, in intravenous therapy, and the last, but not least, advantage both to medical practitioner and chemist is that these dilute solutions are entirely outside the provisions of the Dangerous Drugs Acts.

Alkaloidal Periodides.—It is known that according to methods of procedure, Alkaloidal Periodides of two distinct types can be made, *i.e.*, Base I_n or Base HI + I_n. We prefer to call the first-mentioned true periodides, and, starting from our experimental work on Emetine Periodide (*q.v.*), we proceeded to prepare others, *e.g.*, those of Cinchonodine, Cocaine, Codeine, Morphine, Papaverine, Quinidine, Quinine, Sparteine and Strychnine. Numerous similar analogous periodides could of course be produced.

We provide details of experimental proof of the apparent composition, arguing by analogy with the Periodide of Quinidine.

It is of interest that all these periodides behave differently in their capability of withstanding physiological acid, and *per contra* of liberating the bases in presence of physiological alkali.

As to the pharmacology of these compounds, little or nothing was known. The author therefore enlisted the services of a number of his assistants and determined the dosage of these periodides by the administration of carefully limited quantities. In this way useful knowledge was gained, independent of the pharmacologist and research workers on animals.

There is considerable probability that combinations of this type may have therapeutic properties, and suggestions are made under each individual periodide.

Antimonium.—Our Injectio Antimonii Oxidi Fortior was stated in our last edition to be badly tolerated by animals, by reason of its acidity. We have remodelled the preparation by neutralising the acidity, and have had further animal experiments conducted; even now, it appears that it is too potent to be used in the undiluted form, but should be tolerated in a diluted form—care is needed.

Chemically, the preparation is a definite Glyceryl Antimonite. It permits dilution with water temporarily—*i.e.*, sufficiently long to permit of injection, and throws out Antimonious Oxide in a nascent condition in the tissues. Intravenous injections of Antimony Oxide in this dilute form have been practised, and there is evidence of a severe *T. Gambiense* infection, havng been cured by this and Antimony Tartrate given subsequently, also intravenously.

Antimony Tartrate and **Antimony Sodium Tartrate** have now become almost standard compounds for use in bilharziasis. They are also reported upon favourably in treatment of kala-azar, cutaneous leishmaniasis and other tropical diseases.

Arsenium.—Some discussion has taken place regarding the "toxicity" of commercial samples of Arsenobenzol, and recommendations are provided.

We have removed a large proportion of the theoretical considerations relative to Arsenobenzol. It is now fairly well agreed that every stage of syphilis treated with it requires Mercury subsequently. It is, in short, a good siccative. An interesting evolution is that, in treatment, the body tissues of the patient co-operate. Neither this, nor any other hitherto-used organic Arsenic body, has any marked effect on the spirochetes *in vitro*.

The question of dose is important. It has been proved that if doses of 0·6 Gm. are repeated too frequently toxic effects occur—dermatitis and jaundice may follow; the recommendation is, in fact, that a single dose should not exceed 0·4 Gm. It would appear that Novarsenobenzol is more popular with clinicians than Arsenobenzol—this, no doubt, being due to the simpler procedure in technique.

In the manufacture of the compound, the details provided in the patent specification were found to be incomplete and the composition of "914" differs from that suggested by the theoretical formula. The determination of the "therapeutic action" on mice infected with trypanosomes is a good index of the activity of a given sample.

In this instance, also, we have provided careful instructions, in consequence of the new recommendations as to dose. In administration, the use of a solvent composed of Guaiacol and Glucose seems to be very satisfactory.

In trypanosomiasis, there have been attempts to sterilise the central nervous system by intravenous injection of Arsenicals, and immediate subsequent intrathecal injection of the patient's serum. According to one authority, there is no satisfactory evidence that this sterilisation has been effected.

Sulfarsenol has been praised as the only Arsenobenzol compound which can be given into the muscles or subcutaneous tissues without causing great pain. On the other hand, it cannot be given intravenously. It is allied to Novarsenobenzol—we have a note on its chemical structure.

We have included in this chapter an account of the compound known as " Bayer 205." It is not an Arsenical, but may be conveniently dealt with here. It has been shown to exert a potent action on various trypanosomes, and also to possess prophylactic power. A drawback to its use is that it has an energetic action on the kidneys, but life with kidney impairment is thought preferable to death from trypanosomiasis. Massive doses—as much as 5 Gm.—have been given intravenously, within 50 hours.

Following closely on the heels of the German workers, the French produced a substance termed " Fourneau 309." Three French workers obtained a few centigrammes of the German compound, and by a study of the patents taken out by a German firm they evolved " 309," which appears to behave in an identical manner. The acute French chemical detective skill, in short, picked up the clue, and this may, in a measure, have foiled the attempts to keep the original discovery secret.

Returning to actual Organic Arsenicals, we give a description of Tryparsamide, a derivative, containing in common with Sodium *p*-Amino-phenylarsonate, a pentavalent Arsenic atom. Here, also large doses have been administered.

Alkali Bismuth Tartrates.—As a result of the advocacy of chemicals of this type by the French workers, for their utility in syphilis and other protozoal affections, it became necessary to go thoroughly into their chemistry. Considerable confusion arose, in part by the rather vague nomenclature used by our French friends, and in part by faulty translation from the French literature. For purposes of injection, these tartrates are neutral in reaction, and either a simple neutral Sodium Bismuthyl Tartrate or a combined neutral Sodium-Potassium Bismuthyl Tartrate is employed. Alternatively, one might employ a Potassium Bismuthyl Tartrate, but, on the whole, the Sodium-Potassium compound would seem best. " Organic " Bismuth is given either in a sterile oil suspension, or with a more moderate range of doses, in aqueous solution.

We provide working formulæ to enable the pharmacist to prepare them, if he wishes. It is stated that in practice the spirochetes disappear rapidly from a syphilitic chancre, even after a couple of doses, with subsequent healing, and that in the secondary stages, eruptions and mucous patches clear up quickly.

We would give a word of warning on the subject. There are drawbacks to Bismuth medication ; gingivitis and stomatitis are relatively common sequelæ, as also are effects on the digestive tract and kidneys.

There are, in commerce, a considerable number of these " Tartrate " compounds for injection—we have described those most in demand.

As relatively a side issue, the acid preparations for use *per os* in conjunction with Pepsin are dealt with.

A further step was the employment of Bismuth Oxide in fine suspension, as in the preparation Muthanol. To our idea, this seems

a very reasonable procedure. We see no reason why such a compound should not be preferable to a body containing only half its weight of Bismuth, and there seems no special virtue in the Tartrate radical, except from the aspect of its being a relatively non-toxic vehicle for carrying the effective metal.

A further method was, indeed, to use the metal itself in a finely divided condition. It is difficult to say whether this simplification has advantage over the use of the oxide. One has in mind the efficacy of Mercury, as such, as largely used in Injectio Hydrargyri Intramuscularis.

Another ramification is " Bi-Quinyl," which is a double iodide of Bismuth and Quinine.

Caffeine Sodium Benzoate.—In reasonable dose intravenously this is said to be the best and most reliable stimulant for desperately ill patients. The injection improves breathing, circulation and other fundamental functions; the mind and depressed vital functions become promptly active and normal.

Calcium.—While Lime salts *per os* have no effect on blood Calcium, deep intramuscular injections control hæmorrhage. Directions for the procedure are provided.

Chloroform.—In this chapter we include notes on Ethylene and Acetylene, both of which gases have been tried as general anæsthetics. There are also some remarks on Trichlorethylene—small doses of this inhaled, are of value in treatment of trigeminal neuralgia.

Cinchona.—The acquisition of the Amani Institute in what was German East Africa has placed us in possession of certain valuable " bark " hybrids—some showing over 11% of total Alkaloids, and nearly 7% of Quinine.

Coal Tar Derivatives.—There are some suggestions at the opening of this chapter on fever being a salutary reaction. The opinions, though of interest, are open to discussion.

The local use of the " Flavine " dyes continues to be well reported upon for various pyogenic and other types of infection. A recent introduction is **Euflavine** or Neutral Acriflavine. Being more basic than Acriflavine, it is even less irritant to mucous membranes, and is more suited for intravenous injection.

Benzyl Alcohol has been found to be useful in excessive intestinal peristalsis, pylorospasm, and conditions of the nature of persistent hiccough and in whooping cough.

Benzyl Esters.—Numerous compounds of this description, *e.g.*, the Acetate, Aceto-Salicylate, Benzoate, Cinnamate, Succinate and Mandelate have been tried, and notes are given of their properties.

In general, these bodies all produce relaxation of the intestinal muscles, lower blood pressure and depress respiration.

Cyanine Dyes, which are used as photographic sensitisers in colour photography, have been shown to be very active against *staphylococci.*

Auramine and **Nile Blue** were very effective in some experimental work, in extremely dilute solution, against trypanosomes.

Amidopyrin Derivatives.—An addition product of Amidopyrin and Aspirin and another with Veronal, are useful in headaches and neuralgic pains.

Coca.—We have, if we may so call them, some pertinent remarks to make on the abuse of Cocaine. It is clear that newspaper comments on instances of Cocaine traffic are made without sufficient care. These inspirations in the daily press may only add fuel to the fire by appealing to vicious imaginations.

Atropine and Hyoscine are stated to be the best for the treatment of addiction of all kinds. De Quincey, it is said, found benefit from Valerian. Addiction in the U.S.A. is rife, but the extent of it in our own country hardly warrants interference by Act of Parliament in *bona fide* medical treatment of pain and suffering.

" None of the synthetic local anæsthetics equal Cocaine when applied to the mucous membrane "—this is the dictum of a special committee, appointed by the American Medical Association to investigate relative values. Quite recently (B.M.J. July 12/24) work in this country, comparing the effects of the latest local anæsthetics on somewhat similar lines, brought out the result that Cocaine is still superior to the substitutes in general properties, especially in rhinology, and that Cocaine is still unbeaten for eye work.

The synthetic **Butyn** was heralded with some emotion. Having no mydriatic effect, it was thought to have special fields of utility. It, however, dries the cornea and sometimes causes desquamation, and according to the paper (*loc. cit.*) it is believed to have habit-forming properties. Complete directions regarding strengths for use are given.

Cocaine Periodide.—We have already mentioned this Periodide in passing, but may add that it retains most of its alkaloid in presence of physiological acid, while yielding readily a large proportion to physiological alkali. In these circumstances, it may be valuable to relieve painful bowel affections.

Codeine Periodide has been found useful for persistent cough.

Colloidal Metals.—These continue to be largely prescribed. An *ex cathedra* statement from a valuable recent treatise by the late Sir W. M. Bayliss is that they remain stable for some time in the absence of " protectives." With all due deference, in practice, we fear that their exclusion would be unsatisfactory. Of more interest, is the information that isotonisation at the time of use is unnecessary. We are fully in accord with the authority who finds that certain preparations of commerce are far below the strength stated.

New information on Colloids (in the Colloidal Metal Chapter) is given under Aluminium Hydroxide, Arsenious Sulphide, Bismuth Hydroxide, Calcium, Gold, Iron and Lead.

The **Calcium** (Oleate) compound has been advocated in tuberculosis.

Colloidal Gold has been definitely proved of service in the treatment of neurasthenia, alcoholism and the Morphine habit.

Colloidal Lead intravenously appeared to arrest the growth of malignant neoplasms. The subject is still under consideration by the authority who has worked on the project.

Cupreæ Cortex.—Amongst the Cupreine derivatives, Ethyl Hydrocupreine Hydrochloride ("Optochin") has important properties. It is mostly used locally, in dilute solution, in eye affections. It is, in addition, used internally, but it is important to note that for treatment of pneumonia the *basic* substance, Optochin Base must be prescribed, otherwise grave visual disturbances are liable to be produced.

Digitalis.—Some new instructions in therapy are given, and some interesting notes on large doses. Having worked on the constituent lucosides of the leaf in the past, we were interested to read that 'therapeutic doses of Digitalis do not contain enough saponins to induce any undesired effect."

Iodum.—It is a somewhat unfortunate circumstance that the Fr. Cx. Supp. II. (1922) removed the Teinture d'Iode (Fr. Cx. 1908) as an Official preparation. This was a 10% preparation by weight of Iodine, in Alcohol 95% (vol.) and it is now superseded by a Tincture termed Teinture d'Iode officinale, containing Potassium Iodide. The "intensive" Iodine treatment of tuberculosis with the original preparation, and more recently the remarkable successes with it in a number of arthritic cases, and cases of chronic gout in England, render the change very confusing.

To prevent misunderstanding by chemists, we recommend prescribers to order "Tinct. Iodi Fr. Cx. 1908, 10% w/w." In this way the instructions will be perfectly clear. We give numerous suggestions for making miscible mixtures to be taken in water, milk, etc.

Ipecacuanha.—Work continues to centre upon Emetine, as paramount in combating *Entamœba histolytica* in dysentery. The current view is that the curative value of the alkaloid is not proportional to its action on the amœbæ, but to its poisonous action on the patient. The infected person's body fluids play an important, perhaps primary, part in killing the parasite.

Apart from the use of Emetine in amœbic dysentery, we may mention, in passing, that many other affections have been treated with it, *e.g.*, bilharziasis, Guinea worm, Oriental sore, acute articular rheumatism and even the Morphine habit.

Emetine Bismuth Iodide continues to be of service, though, as we have repeatedly pointed out, it was introduced under an erroneous impression. The alkaloidal portion of the compound is promptly soluble in 0·2% Hydrochloric Acid. "E.B.I." has certainly some successes to its credit, but it has been found so unpleasant in assimilation, that patients refuse to take it—even as a medicine.

Emetine Periodide.—On p. 527 *et seq.* is a résumé of a paper (and the subsequent discussion) which the writer, together with the Senior Medical Officer, Tropical Diseases Section of the Ministry of Pensions Hospital, Orpington, had the honor of delivering before

the Royal Society of Tropical Medicine and Hygiene, in May last year. The work embodied in this paper was, in effect, a co-operation between a small team of investigators. Compounds devised in the chemical laboratory were submitted with due care to clinical trials, and to Dr. Graham Willmore is due the credit of having worked out by investigation the course of doses of Emetine Periodide. This periodide had not previously been made nor administered to man, and differs entirely in its chemical properties and its effects from Emetine Bismuth Iodide. Examination of dejecta in the pathological laboratory, for amœbæ and cysts, demonstrated its effectiveness in a large proportion of cases.

A preparation termed **Emetol**—a solution of Emetine base in Olive Oil—has also been employed for medication *per rectum*, more especially where preliminary sigmoidoscopy showed ulceration of the lower bowel. Directions for preparing this injection are provided. In addition, notes are given on a series of preparations, including Paremetol, Emetine Oleate Pastils, Ravaut's Paste Pastils, etc., which were also made during the investigation.

There are a variety of good points in favour of " E.P.I." It does not cause vomiting or depression, and has no effect on the heart, and as to its positive effects, we may perhaps be pardoned for remarking that it was found to be the most efficacious preparation tried.

Morphine.—With the exception of the addition to this chapter of Morphine Periodide—interest seems to have been focussed mainly on the morphinist, and the difficulties—shall we say the impossibility ?—of his treatment. Most of our readers would agree with us that the restrictions of the Dangerous Drugs Acts will fail to cure him—drastic though they are. His cure is in a self-control passing all conception.

Nutrimenta.—The meaning of Pasteurisation of milk is now more clearly defined by the Ministry of Health Order, " Milk (Special Designations) Order, 1922." There are numerous expressions of opinion under this heading.

Accessory Food Factors.—Although the chemical composition of Vitamins remains, even now, ill-defined, a vast amount of research has been conducted in the direction of observing the destructive effects of heat and oxidation upon them.

So far as Vitamin A is concerned, Cod Liver Oil, being so rich in this constituent—250 times as potent as butter—is definitely proved serviceable in the prevention and cure of rickets. As a side issue, however, Calcium is also requisite, and the recommendation has been made to add a small proportion of Calcium Carbonate to butter for general consumption. Incidentally too, an authority holds that, in all probability, the separating of butter fat from milk spoils both. This is, no doubt, a good point to make. Cod Liver Oil may perhaps be designated with truth " bottled sunlight," because sunlight in itself, or indeed the Mercury Vapour Lamp, has been shown to cure rickets.

On the principle of *audi alteram partem*, we provide also a series of "*contra*" views, in the form of brief abstracts from recent papers. It is not necessary to detail even a summary here—the reader is referred to p. 593.

Now, this country spends £500,000,000 a year on imported food. These products, it has been pointed out, may be deficient in vital principles. We are ready to agree that it is not possible to grow food sufficient for our needs, but certainly we might uphold the value of home-grown produce. Frozen meat, whatever our experimentalists may say, lacks the vitalising power of English home-grown food. The canned meat of the Argentine or Californian fruit can never replace the fresh products. Note the following abstract :—

> "Canned Foods in relation to Health. Importations in the year 1921 retained in Great Britain, amounted to over 248,000 tons, or about 278,000,000 separate 2 lb. tins (22,500 tons of meat, 32,700 tons of fish, 88,300 tons of fruit and vegetables, and 105,000 tons of condensed milk). Canned foods thought to be safer than fresh and of economical value to the consumers !—L. i./23,527."

In other words, the British working-man, labourer or city clerk, should be fed on canned meat, fish and fruit and condensed milk brought thousands of miles and "undated," while our agricultural industry steadily declines, or its pursuit is, at best, a hobby. Estates are deemed *liabilities*, not assets, by owners.

These remarks are, perhaps, slightly in the nature of a digression, though by no means entirely so. They concern Vitamins, and the upbringing and maintenance both of the city worker and the landsman.

To continue, we deal with the "Water Soluble B"[2] factor, and the "C" factor on analogous lines.

As practical issues, one may refer the reader to the Antiscorbutic Tablets, which have been proved to retain their efficacy for twelve months; Lemon Juice has four times the Vitamin "C" content of Lime Juice; germinating beans were used in the treatment of scurvy in the Serbian Army; Orange Juice neutralised, has been administered intravenously, as a curative remedy and Strawberry Extractive is given in sprue.

"Butol" Emulsion V.H.C. and Emulsio Sevi, U.C.H., are representative for infant feeding, more particularly from the Vitamin "A" aspect; and for the "B" factor numerous Yeast preparations are available.

Oleum Chaulmoograe.—This oil, and its derivatives, continue to be the standard treatment of leprosy, but it is ill advised to exaggerate claims for these preparations. It is open to question whether the introduction of the Ethyl grouping to replace the Glyceryl radical will result in greatly enhancing the powers of the oil.

One may, however, say that, at present, no better remedy than Chaulmoogra, in one form or another, is available.

We give a formula for an injection of the oil, for intramuscular use, in addition to notes on the Chaulmoograte "A" and "C,"

upon which we worked a few years ago. To our minds, treatment must be a saturation of the system—the evidence of patients is to that effect—but, we repeat, it is unpardonable to raise false hopes of leprosy sufferers. We give, also, directions for making the "Ethyl Esters." (To those interested, we may add, in passing, that there is, at the time of writing, an excellent collection of a series of allied Esters in the India Building at the British Empire Exhibition, made by a firm in India, which is a credit to its initiative and enterprise.)

It has been suggested to include a proportion of Iodine in the Ethyl Esters, but experimental proof of utility of this addition is wanting.

There is included in the Oleum Chaulmoogræ chapter an abstract of a recent paper enforcing the view that leprosy is a self-healing disease. The theory of action of these fatty acids is fully dealt with, and treatment is outlined for three separate stages of the infection.

It becomes rather an important question whether the *acids* of Chaulmoogra Oil, injected as such, would not be best of all—we suggest, tentatively, an injection of Chaulmoogric Acid "C" in sterile Oil—in fact, there is no reason why the entire acids should not be given in similar manner.

The literature on the subject has been voluminous; a résumé of abstracts is given in the chapter on the oil.

In the matter of treatment, one cannot obviously force preparations that cause pain upon patients, and as to ætiology, the absence of sanitation, *e.g.* in China, is notorious.

We cannot leave the subject of leprosy without printing the following extract from a letter we received a few weeks ago from a friend in Brazil—a keen observer in scientific matters, but not a medical practitioner. His opinions are of interest at the present time:—

> "It appears that the nodular form of the disease is more amenable than the anæsthetic to Chaulmoogra treatment. A peculiar problem in the treatment arises from the fact that the higher the degree of infection the lower the limit of toleration for Chaulmoogra or Cod Liver Oil derivatives. This is explained by the theory that the destruction of the bacilli sets loose toxins in the bloodstream, and in proportion as more germs are killed more of the toxins are released, with a proportionately greater violence of reaction. It thus follows that in very early cases with slight symptoms, heavy dosage, even the saturation of the system, may be quite practicable, whereas on the other hand, in advanced cases, with their enormous degree of infection, far lighter dosage may set up febrile reaction threatening the patient's life. This is not all, however, one disadvantage begets another. The light dosage, after long treatment, makes the germs resistant, and progress eventually comes to a standstill. This appears to have happened with most of the cases receiving treatment by the Federal Government Missions, but of course no individual supervision of patients, such as might determine the toleration limited, and then enable the remedy to be pushed as toleration ascends, has been attempted.

Our friend considers, further, that the disease in Brazil is more common, and more often spontaneously disappears, than has hitherto been supposed, as there is no other explanation of the great disproportion between the prevalence of extremely mild cases among

children, and the far less frequent cases which reach an advanced stage. (As an instance he mentions that of 60 children examined in one day, 25% were found to have incipient leprosy.) Very little has been done by the State Authorities to segregate the lepers, and there seems to be no possible way of entirely avoiding contact with them, as the disease in its early stages is so inconspicuous as to escape the notice of even an expert. He gives several illustrations of possible infection. In one instance, a girl suffering from leprosy attended a public ball. The visible signs of the malady in her case were then confined to her ears, but her coiffure completely covered them! The most amazing is as follows :—

> "At —— I found that the Franciscan monks at the monastery *had a leper doing their cooking.* The man's anæmic look arrested my attention. Then I noticed a number of huge burns on his arms from accidental contact with the stove. It strongly suggested an anæsthetic condition, but no other suspicious signs were apparent—no appearance of atrophy, no red or pale patch on the exposed skin. But happening one day to call at the monastery, in passing the kitchen, I caught the cook with his blouse open (no shirt worn). Several large reddish plaques, visible on his chest, settled all remaining doubt, and I advised the prior, who was horrified and incredulous, but sent the man to ——, where my diagnosis was promptly confirmed. The man had been eight months in the monks' employ! (One of the priests who is on extended leave of absence is sojourning in ——, and in greeting him in January I saw up his sleeve. There are red plaques on his arms!)"

In such conditions, we think our readers will be in entire agreement with our correspondent, when he urges the extreme advisability of warning intending settlers in Brazil of the need of studying the early signs of leprosy for their own protection, and of the danger of engaging servants without previous medical examination; also against allowing native children around their abodes.

He adds that from observations dating back over twenty years, the spread of leprosy in South America appears to have a definite relation to the distribution of certain blood-sucking insects, particularly bugs of the genera *Cimex* and *Conorhinus*, and mosquitoes of the genus *Culex*; but, in connection with the bed-bug theory, as far as Brazil is concerned, this does not appear to hold good, as, for some unaccountable reason, he says, bed-bugs do not exist in the Amazonian villages, although they have been heard of in low-class hotels in Para and Manaos.

Opium.—Here, also, as is the case under the Cocaine Section and that devoted to Morphine, we give salient points relative to abuse. Over £1,000,000 worth of drugs—mostly Heroin—were seized in New York during the year ending June, 1923. We have gone out of our way, so to speak, to give an account of treatment of Opiate addiction by "Withdrawal" and "Gradual Reduction," from a work written from the American point of view. Some of the procedures, to say the least of them, appear drastic.

Pancreas.—In this chapter is an account of **Insulin** under appropriate headings, such as "Dose," "Manufacture" (including the Picric Acid process), "Chemical Examination," "Units," "Technique of Injection," "Suitability of Cases," "Contraindications,"

" Effects of Excessive Dose," " Clinical Experience " and " General References."

Protein Therapy.—An attempt has been made to systematise this somewhat discursive matter for convenience in ready reference. We commence with an account of Skin Reactions, giving details as to the manufacture of the Test Solutions, then follow directions as to technique in application of tests, and remarks on diagnostic value. Subsequently, the subject of Peptone Immunisation in bronchial asthma, with directions for its conduct, is dealt with. The treatment has been used in a variety of conditions, exhibiting an anaphylactic character or sensitisation. At the conclusion of these remarks is a note on Milk Injections in gonorrhœa, with the *raison d'être* of the method.

Coming now to more defined bodies, in the **Phenolphthalein** chapter will be found ample details of Flumerin and Mercurochrome " 220." The former is a new mercurial for intravenous treatment of syphilis, and the last-mentioned a vesical antiseptic containing over 20% of Mercury. As a general rule, 1% solutions of Mercurochrome are used as bladder irrigants. The recommendation to employ 25% solutions in gonorrhœa requires careful thought, and further experimental knowledge.

Oleum Terebinthinæ.—In certain types of skin affections, which are detailed, intramuscular injections of Rectified Turpentine in Olive Oil have proved beneficial.

Potassium Iodide.—There is, under this heading, some useful advice on the treatment of goitre. Switzerland has been attacking the problem of its lack of Iodine in the water in the Alpine Valleys by adding Potassium Iodide, in small proportion to table water. (See also Therapeutic Index and Sodium Iodide.)

With regard to exophthalmic goitre (see p. 699) small doses of Sodium Iodide given in the spring and autumn have reduced the number of cases in the districts where it is endemic, and the reasonable expectation is that by reducing tendency to simple goitre in early life the number of cases of Graves' disease, occurring in later life, may also be lessened.

Quinidine, Cinchonidine, Cinchonine and Cinchona Febrifuge.—We have here grouped together the latest news on the treatment of malaria, more particularly of the benign tertian type. Full details of the chemistry of these alkaloids and their preparations are provided.

Much has been written on the treatment of auricular fibrillation with Quinidine Sulphate. The evidence of its efficacy is, on the whole, favourable.

Quinine.—" Quinine in malaria and relapses " is invariably a difficult subject to review, owing to the extreme divergence of opinions expressed, but on this occasion there is a good paper available (p. 714), in which Sir R. Ross lays down the instruction that 10 grains daily, rigorously for three months (84 days), is sufficient in the majority of cases.

Following some discussion in the past, we are now able to give general directions for an **Intravenous Injection of Quinine.** The Acid Hydrochloride is to be used in preference.

Sulphur.—The comparatively new preparations, Intramine and Contramine, are here described in some detail.

Urea.—Amongst new Ureide preparations may be mentioned Butyl-Ethyl-Barbituric Acid and a combination of Allyl-isopropyl-Barbituric Acid with Amidopyrin. The question of the power of Luminal in epilepsy has been the theme of several papers.

In the SUPPLEMENTARY LIST the following may be referred to :— Carbon Tetrachloride and Chenopodium Oil treatment of ankylostomiasis ; Holarrhena Antidysenterica ; Nicotina (the products of tobacco, cigar and cigarette smoking) ; Norit (a special type of Charcoal), and the inclusion of a number of monographs, removed from the body of the work for the sake of space.

Pharmacists, and to some extent Medical Men, may, we venture to think, be interested in the following points, which occur here and there in the main portion of the book :—

Bismuth Tribromphenol—further notes on manufacture.

Acid Cresylic Disinfectants, supplied containing less than 3% Phenols are relatively useless.

Ethanesal. This anæsthetic has been considerably discussed, and certain conclusions are drawn.

Alcohol Duty and Rebate. A concise statement of the alterations in Excise Duty, and the position shown up-to-date.

Methylated Spirits. The recent (May 1st, 1924) introduction of Pyridine bases, as denaturant, is of importance. Quite recently, we have had reports of unpleasant effects on the skin by its local use, and complaints have been made of its effects in sterilising instruments.

The concession to registered chemists and druggists, in respect of medical men's prescriptions, for use of Mineralised Methylated Spirit, is defined.

Wood Alcohol Poisoning receives a note, but it is relatively little seen in this country.

Sodium Cacodylate, if rendered neutral to Litmus, rather than to Phenolphthalein, is found to be better tolerated.

Atropine Ointment. Recent comparative trials of a variety of formulæ, at our request, show that the addition of Oleic Acid, to combine with the Atropine, is apparently unnecessary.

Bismuth Oxychloride in a " nascent " form, *i.e.*, in a finely divided condition, is suggested for pain and vomiting in gastric catarrh and other affections.

Nucleinic Acid for Injection. This is best given in the form of Sodium Nucleinate. We give the necessary directions. Administered intramuscularly, Sodium Nucleinate increases the leucocyte count. It was found of value in influenza.

Para-phenylenediamine. The irritant effects of this and numerous allied compounds, on the skin, when used as fur dyes, are described. It is of interest that Metaphenylenediamine can be extracted from furs dyed with it, by means of Saline and Wool fat—hence, no doubt its ready absorption and its poisonous effects on the skin.

Can **Cocaine Hydrochloride Solutions** be boiled in glass vessels? The answer is in the affirmative. There seems to be some misconception of the position.

Hydrargyri Oxycyanidum. The formula for, and solubility of this compound have been much discussed. We now give a revised formula. There is no difficulty in obtaining a compound of the solubility given in our last edition, which we retain.

Manganese Butyrate. Directions for making are provided and the utility of the substance is shown.

Paraffinum Liquidum. A careful clinical comparison of treatment with low and high viscosity oil, showed clearly that the sample with high viscosity was more suitable as a laxative.

Theobrominæ et Sodii Salicylas. Incompatibilities are worthy of attention.

Vaccines and Antitoxins.—This chapter has been completely overhauled with the assistance of a specialist conversant with the latest developments.

In the opening pages there is a résumé of a general paper on "Local Immunity in Infectious Diseases," recently communicated by Prof. Besredka, dealing virtually with vaccination by the route of the intestinal tract—the criticisms, in particular, are of interest. Oral administration has hardly found favour here. There is a further reference to Besredka's work on Vaccines by the mouth in the section dealing with Catarrhal Vaccines—which are occasionally ordered to be administered in that way. The mere possibility of efficacy of this method was questioned at one time, in view of the extent to which foreign protein is broken down by the intestinal mucosa. In addition, there is an account of the Pas-de-Calais investigations under "Typhoid."

Bacteriophages are briefly referred to.

Asthma. It is admitted that bacteria are not the universal cause of asthma, but a number of patients have found relief from attacks, for prolonged periods, by injections of Autogenous Vaccines.

Bronchitis and Pulmonary Catarrh. Similar remarks apply in these affections also.

Antimeningococcic Serum.—Notes on the work of the Conference on Standardisation will be found here, and under Diphtheria Antitoxin, Dysentery Serum, Anti-pneumococcic Serum and Tetanus Antitoxin.

Cholera.—We give some of the statistics dealing with the appalling death rate in countries where the disease is endemic.

Colon Bacillus Vaccine.—The treatment of rheumatoid arthritis by this vaccine intravenously, on non-specific lines, is thought, at least, to be an adjuvant to more recognised methods.

Diphtheria Antitoxin.—A Ministry of Health Memorandum lays down instructions as to dose, both in treatment and prophylaxis. Diphtheria Prophylactic (Toxin-Antitoxin) is now definitely believed in and employed, both here and abroad.

Dysentery.—As an aftermath of the war, is a note on dysentery in the Salonika Forces, correcting previous information.

Gonorrhœa.—The evidence is that autogenous vaccines are of great value.

Influenza.—Discussion continues regarding epidemiology. The view generally is that *Pfeiffer's Bacillus* plays, usually, a part of vast importance, coupled with hæmolytic types of *streptococci*. The epidemic in the early part of last year had no special predominating organism. Many observers believe that a filter-passing virus is the cause of the infection. Reference is made to recent important work on the filter-passing virus, *B. pneumosintes*.

Rheumatic Affections.—Reports on treatment with *S. rheumaticus* Vaccine are favourable.

Streptococcic Infections.—Autogenous vaccines prepared from *streptococci* found in the teeth and intestines may be efficacious.

Tetanus.—The antitoxin will prevent tetanus in animals, if given before tetanus inoculation, but it has no effect after. During the war, patients were veritably flooded with antitoxin, those cases only recovering which were not too severe or chronic. The reason as shown by F. H. Teale, is that the antitoxin does not gain access to the spinal cord through the circulation.

Work has been done to determine how far the Antiserum protects against infection with *B. tetani*, as distinct from Tetanus toxin. To cause infection, with multiplication of the bacilli and development of spores, the local defence of the tissues must be broken down by some such agents as ionizable calcium salts or colloidal silica.

Tuberculosis.—With regard to aetiology, sputum-contaminated dust of dwellings and public places inhaled and ingested with the air and food in populous districts is surely the most frequent cause ? Some would seem to decry the view.

During the war 40,000 men were discharged from the army with a diagnosis of pulmonary tuberculosis. There is an abstract of an interesting paper on Tuberculosis in Wales. Mortality there is apparently higher. The reasons are given.

It is, nevertheless, agreed that in general, gratifying advances have been made. Quite recently an official of the Ministry of Health has declared that tuberculosis may be stamped out entirely within the next ten years—thanks to preventive measures, earlier treatment, improved sanitation and the like. One hopes the prediction will be justified by the ultimate results.

With regard to Tuberculin and other treatment, a specialist says there is little hope of finding any drug that can destroy the bacillus without damaging the delicate tissue cells, or reach the organisms entrenched in masses of necrotic tissue, but "success may ultimately be achieved on these lines."

With regard to "New" Vaccines, mention should be made of Nathan Raw's Immunising Vaccine and Dreyer's Vaccine, accounts of which are given.

Tuberculin Reactions for Diagnosis.—The entire subject has been re-written.

Typhoid.—We have already referred to Besredka's investigations, which are mentioned here. Quite recently, there was a statement that Vaccine *per os* gave excellent results in an outbreak amongst natives in a gold-mine near Germiston (S.A.).

Small-pox.—By a somewhat curious coincidence, the recent outbreaks of small-pox in London and elsewhere in Great Britain have almost synchronised with the Jenner Centenary. We include a useful set of "points," generally relied upon to distinguish chicken-pox from small-pox. An authority enjoins the importance of young men familiarising themselves with the subject. It is stated that one mistaken diagnosis abroad gave rise recently to an epidemic in which 3,000 people died. An extension of the bibliography, bringing the matter up-to-date, will we believe, be useful. Four out of five of the population of this country are unprotected by vaccination. The question of identity or otherwise of alastrim with small-pox is still unsettled.

Animal Organotherapy.—We include in this chapter an account of a number of desiccated animal tissues and liquid extractives, together with those of the endocrine glands, but with the exception of Insulin, which we deal with under Pancreas.

Preparations of the Thyroid, Parathyroid, Suprarenal and Pituitary continue to be largely prescribed, but there is one outstanding factor which needs careful consideration, viz., that generally speaking these preparations are not readily capable of standardisation. It is possible, therefore, for weak preparations to find their way into commerce. Assay methods are to some extent in use in regard to Thyroid, Parathyroid and Pituitary, but, as yet, nothing is officially laid down.

We embody clinical notes from medical journals under the various headings. To be candid, in some instances, we refrained from burdening our pages with items bordering on the hypothetical—the ligaments of credulity were stretched to too great an extent.

We have endeavoured to handle this difficult section with thoroughness, and must ask our readers to consult the pages relative to Pituitary, Suprarenal, Thyroid and Parathyroid, in which much new matter is incorporated. The new "B.M.R." method of proving adequate thyroid activity is explained.

The wonderful results from intracardiac Adrenalin injections provide pleasant reading.

The Parathyroid glands are viewed as regulators of Calcium metabolism, and they are thought to act on certain toxic substances, rendering them harmless. Clinically, the administration of Parathyroid is thought to restore the Calcium balance of the blood and produce improvement in general health.

Blood Transfusion.—We have a section on this operation, which may be useful on occasion. Its conduct was attended with brilliant results during the war.

Poisons.—The Poisons Schedule is brought up-to-date. An important recommendation by Sir Wm. Willcox that the sale of Arsenical preparations should be limited on the part of the seller to qualified pharmacists, and on the part of the purchaser to those who obtain a licence, formed the subject of a resolution carried by the British Medical Association. This would repeal the 1908 Act so far as the sale, *e.g.*, of Arsenical Weed Killers by ironmongers, etc., is concerned.

DANGEROUS DRUGS ACT, 1920, AND DANGEROUS DRUGS AND POISONS (AMENDMENT) ACT, 1923.

We give a most thorough synopsis of these two enactments, and the subsidiary Statutory Rules and Orders, and have arranged in the form of tables permissible limits for Official and semi-Official preparations in Mixtures, Injections, Spray Solutions, Pills and Tablets, Lozenges, Liniments and Lotions, Suppositories, Bougies, etc., which will form a guide to practitioners and others.

Added to this, we have spent many hours in going systematically through our pages, indicating by means of the sign Ⓓ those "drugs" which come within the meaning of the Acts in respect of their content of Morphine, Cocaine, Ecgonine, Diamorphine and Medicinal Opium.

We have gone a step further, showing by means of examples what the practitioner has to do when prescribing these drugs or preparations of them in excess of the proportions specified in the Acts. For those who are not sufficiently initiated, the examples of a dentist's and a veterinary surgeon's prescription are also of importance, and, in conclusion, there is an example of a "Signed Order" by a qualified practitioner ordering an assortment of Ⓟ1 poisons and Dangerous Drugs, required for the purposes of his profession, to be sent to him by post, and complying with Section 3 of the 1923 Act.

It may be to an extent gratuitous, but our criticism of these network enactments is that they are unreasonable, both to the medical practitioner, the pharmacist, and, in consequence, to the patient. It would be easy to show that a person who is ill and in pain is subjected to increased and unnecessary suffering in consequence of some formality not having been carried out. The onus is on the pharmacist in the matter of supplies, and it is our experience

that almost *hourly* in the course of dispensing these drugs it is necessary to refuse or delay a prescription because of some formality required by the Acts. The Acts in fact punish those who ought to be supplied, for the sins of those who abuse the drugs.

As to some of the calculations which are required, we fail to see how any medical practitioner can be expected to conduct them, even in his less harassed and hurried moments. However, he may rest assured the pharmacist is always ready to assist him in these difficulties. A medical man's province is obviously to use his best endeavour for his patient, not to juggle with abstruse calculations.

As a reminder to some of our readers, the Acts have ***not*** made grains and minims interchangeable units, as are Grams and cubic centimetres.

Intravenous Dose Table.—During the last few years we have come across some extraordinary statements as to doses of chemicals for intravenous medication. Time and again we have hesitated to print them. It seemed of importance to arrange suitable doses of the leading substances in the form of a table, giving both the amount of the chemical and the volume of diluent. The proportion of the chemical and the slow rate of injection are, of course, the important factors. Even when this was done, we were inclined to add a word of caution at the heading of the table, *q.v.*

At the conclusion of our work, it is a pleasure to acknowledge the kind assistance of several medical men to whom we have referred on points of doubt in regard to special subjects. In addition, we are glad to record our appreciation of the services of W. K. Fitch, Pharmacist, who has assisted in calculations relative to the Dangerous Drugs Acts and in proof reading, as also the help which S. Back, B.Sc., has given in conducting chemical laboratory investigations under our direction.

Reverting again to the care which is obviously needed in handling drugs of every description, we venture with all respect to remind the physician that he should not take exception to a chemist communicating with him on matters of doubt relative to prescriptions and the like. Therapy to-day is so extremely discursive and complex, that it is only by careful co-operation and mutual goodwill that mistakes can be corrected and dire consequences be prevented.

We plead also for goodwill on other scores. From time to time during the last four years, in the preparation of this edition,—and indeed we have had the circumstances before us for the last thirty years—we have made notes with a view to appealing to the practitioner to help forward British industry.

Some of these notes have been written in plain statement of fact; we have described the British worker's up-hill task in the face of difficult competition from a dozen view-points. At times we have expressed our thoughts in bitterness and sarcasm.

We have reflected that nothing apparently would alter the outlook of the individual who is unable to visualise the workman (the man who wants to work) returning to his lodging after yet another fruitless journey to the factory. Many factories have not recovered since the war. Some workmen have not had regular employment *for years* and at the present time vast tonnage of finished manufactured produce is dumped daily at our docks.

Fiscal considerations and the present burden of taxation must surely have some weight in our national life. We venture to ask medical men to assist the English chemical worker to their utmost. That science is international is an ideal never completely achieved; one might say it is humanly impossible. The idea is not borne out by experience nor by the ordinary observation of the man in the street. On the contrary, science and commerce are interlocked, as our national rivals know.

The notes we have referred to lie before us. We discard them all in the knowledge that Englishmen who happen to glance at these prefatory remarks can read between the lines at this juncture and agree with us.

A man's life is a wondrous balance of four factors—his love for his Creator, his love for kith and kin, his love for the land of his birth, and his love for the work he has been set to do. Upset one of these factors, and you spell disaster.

W. Harrison Martindale.
W. Wynn Westcott.

London, September, 1924.

ABBREVIATIONS.

When the reference is to a periodical, the number put first is the number of the volume; then follow the last two figures of the year, and the last number refers to the page, thus, B.M.J. i./24,500.

Allen.—Allen's Commercial Organic Analysis—Edited by H. Leffmann, M.A., M.D., W. A. Davis, B.Sc., A.C.G.I., and S. S. Sadtler, S.B., Fourth Edn., 1909-1917, 9 vols. also Fifth Edn. of Vol. 1 (1924).

Am.Jl.Ph.—American Journal of Pharmacy.

Batty Shaw—Organotherapy, or Treatment by means of preparations of Various Organs, H. Batty Shaw, M.D., F.R.C.P., 1905.

Bayliss.—'The Colloidal State and its Medical and Physiological Aspects.'—by the late Sir W. M. Bayliss, 1923.

Beddoes.—Syphilis, Its Diagnosis, Prognosis, Prevention and Treatment, T. P. Beddoes, 1909.

B.Pt.—Boiling Point.

B. & C.D.—British and Colonial Pharmacist, London, previously B. & C. D—British and Colonial Druggist.

B.M.J.—British Medical Journal, London

B.M.J.E.—British Medical Journal Epitome.

Berl. Klin. Woch.—Berliner Klinische Wochenschrift, Berlin.

Bosanquet.—Serums, Vaccines and Toxins in treatment and diagnosis, W. Cecil Bosanquet, M.D., 3rd Edition, 1916.

B.P.C.—British Pharmaceutical Codex, 1923.

B.P.C. 1894 or 1901—Formulary of the British Pharm. Conference.

Brickdale.—Guide to Newer Remedies, by J. M. Fortescue-Brickdale, M.A., M.D., 1910.

BromptonH.—Pharmacopœia of the Hospital for Consumption and Diseases of the Chest.—Brompton, Tenth Edn., 1914.

Brooke.—Tropical Medicine, Hygiene and Parasitology, by Gilbert E Brooke, 1920.

Can. Form.—The Canadian Formulary of Unofficial Preparations.

Caspari.—Pharmacy for Students and Pharmacists, C. Caspari, jun., 1906 and (4th Edition), 1910.

C.D.—Chemist and Druggist, London.

C.H.W.—Formulæ of Chelsea Hospital for Women, 1900.

C.L.T.E.—Central London Throat and Ear Hosp. Pharm., 1901.

Chemical Abstracts.—Published by the American Chemical Society.

Chem. News.—Chemical News, London.

Clin Jl—Clinical Journal.

Colyer's Dental Surgery and Pathology.—1923 (previously Smale & Colyer's Diseases and Injuries of Teeth).

Comptes Rend.—Comptes Rendus Hebdomadaries des Séances de L'Académie des Sciences.

C.R.—Proposed changes in the British Pharmacopœia, in accordance with the International Agreement for the Unification of Pharmacopœial Formulas for Potent Drugs signed at Brussels, Nov. 29, 1906, from a report to the Pharmacopœia Committee of the General Medical Council. Adopted by the Committee of Reference in Pharmacy, March 4, 1907. This Committee issued further reports in 1908, 1910, 1911. *cf.* F.I.

C.X.—Charing Cross Hospital Pharm. 1922.

Cushny.—Text Book of Pharmacology and Therapeutics, Arthur R. Cushny, M.A., M.D., F.R.S., 8th Edition. 1923

℞.—Drugs or preparations coming within the scope of the Dangerous Drugs Acts, 1920 and 1923.

Dawson Turner.—Radium, its Physics and Therapeutics, by Dawson Turner, B.A., M.D., 2nd Edition, 1913.

D.M.W.—Deutsche Medizinische Wochenschrift, Leipzig.

Digitalis Assay.—W. H. Martindale. A communication to the Pharmaceutical Society of Great Britain, 1913. (H. K. Lewis & Co., Ltd.)

Disp.—Art of Dispensing, Peter MacEwan, F.C.S., Ph. Ch., 9th Edition, 1912.
E.G.A.—Elizabeth Garrett-Anderson. Hosp. Pharmacopœia, 1920, Euston Road, London (formerly New Hospital for Women).
Ec.Prod.I.—Economic Products of India, 1889–96.
E.L.—Pharm. of East London Hospital for Children, 1915.
E.—Pharm. of Evelina Hospital, Southwark, 1906.
Ed.M.J.—Edinburgh Medical Journal.
Edition XVII.—Seventeenth Edition of this work (1920). Reprinted 1922. For References and comments unavoidably deleted.
Emery.—Clinical Bacteriology and Hæmatology, W. D'Este Emery, M.D., B.Sc., 6th Edition, 1921.
Evans.—Evans' Analytical Notes for 1914-1919.—Evans Sons, Lescher and Webb, Ltd., London and Liverpool.
F.E.—Farmacopea Española Septima Edicion, 1905. Madrid.
F.I.—Formula Internationalis, International Agreement for Unification of Formulas signed 1906—*cf.* C.R. *antea*.
F N.—Formulaire des Medicaments Nouveaux. Bocquillon-Limousin.
F. Norsk.—Den Norske Farmakopϕ, 1913. Norwegian Pharmacopœia.
Fr. Cx.—Codex Medicamentarius Gallicus, Pharmacopée Française. Paris, 1908, Maŝson et-Cie, 120, Boulevard Saint Germain.
Fr. Cx. Supp. I.—Supplement, 1920; Supp. II. Supplement, 1922.
G.—The Essentials of Materia Medica and Therapeutics—Sir A. E. Garrod, M.D., and Sir N. J. C. Tirard, M.D., 13th Edition, 1890.
G.H.—Pharmacopœia of Guy's Hospital, 1916.
Garrod.—Sir A. E. Garrod, D.M., M.A, Inborn Errors of Metabolism, 1923, and other communications.
Gehe.—Gehe's Codex der Bezeichnungen von Arzneimitteln, 1910, 1914, 1920 and 1922.
Ghosh.—Treatise on Materia Medica and Therapeutics, by the late R. Ghosh, L.M.S., Cal. Univ. Edited by B. H. Deare, Lieut.-Col. I.M.S. 8th Edition, 1922 (and Abstracts from earlier Editions).
Glyn-Jones.—The Law of Poisons and Pharmacy. Sir W. S. Glyn-Jones.
G.N.C.—Gt. Northern Central Hospital, 1908. (See also R.N.H.).
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✱ In connection with a text heading signifies that the name which it precedes is a British Registered Trade Mark, *e.g.*, ✱Exalgine. The ✱ is only applied to the principal heading and is not repeated throughout the book

WEIGHTS AND MEASURES.

The British Pharmacopœia (1914) employs the Metric System for pharmaceutical and analytical purposes, but for doses retains the dual system of weights and measures, namely, the Metric and Imperial Weights and Measures. A preparation made according to either system will contain approximately the same proportions of ingredients.

The temperature 16·7° C. (62° F.) is employed for measuring vessels used in the **Imperial System**—this applies to *doses* only so far as the B.P. is concerned. The temperature in question is authorised by the Weights and Measures Act, 1879. For determining **Specific Gravities** the temperature 15·5° C. (60° F.), is used in the British Pharmacopœia (U.S.P. employs mostly 25° C.).

The Board of Trade, May 1, 1908, recognised, as stated in the British Pharmacopœia, the word 'mil' as a short official designation for the millilitre, 'decimil' for $\frac{1}{10}$ of a millilitre, and 'centimil' for $\frac{1}{100}$ of a millilitre. These terms are used in stating 'metric' doses in the British Pharmacopœia, but in paragraphs relating to Analysis and in those relating to the manufacture of galenical preparations the term 'millilitre' is (officially) employed.

In our pages formulæ are given in 'proportional parts,' solids by weight, and liquids by *measure*, as the dispensing of liquids in Great Britain is always conducted by measuring. Exceptions to this rule are always made clear in the text. In those, therefore, in which 'proportional parts' are used, the quantities of solids and liquids may be taken respectively in grammes and cubic centimetres, ounces and fluid ounces, grains and (to be strictly accurate) grain measures, but minims in place of the latter will often be used, and only cause one-eleventh *minus* error.

In the body of the work (but not in the secondary List or Index) the approximate doses of each drug and preparation in terms of the metric system follow those of the Imperial System. For all practical purposes, a fluid drachm may be considered as 4 cubic centimetres; 60 grains as 4 grammes; the avoirdupois ounce (about 28$\frac{1}{3}$ grammes) may be taken as 30 grammes; the fluid ounce as 30 cubic centimetres; and the pound avoirdupois as half a kilogramme (approximately it is nine-twentieths).

In using the metric system, prescribers may consider the British grain as 60 milligrammes (nearer 0·065 Gm.), 1½ grains as 0·1 Gm., and 15 minims (nearer 17 minims) as approximately 1 cubic centimetre. (See table, pp. xxxii and xxxiii.). *Note.*—The U.S.P. also makes 15 minims equivalent to the Cc.

The following approximations will also be useful :—

80 minims = 5 Cc.* = 1 teaspoon.

240 minims = 15 Cc.* = { 3 teaspoons. / 1 tablespoon.

960 minims = 60 Cc. = { 12 teaspoons. / 4 tablespoons. / 1 wineglass.

250 Cc. = 50 teaspoons = { 16 tablespoons (about). / 4 wineglasses. / 1 tumbler.

The word gramme (preferably shortened to **Gram**), is contracted to **Gm.**, and the words cubic centimetre to **Cc.** The contraction **Gm.** in heavy type and with a capital initial letter distinguishes it from gr., the usual (though dangerous) contraction for grain. The latter is only used in our pages in the index for sake of brevity.

In the International Agreement respecting the Unification of Pharmacopœial Formulas for Potent Drugs signed at Brussels on Nov. 29, 1906, it was agreed that the normal **Drop Measure** officially recognised shall have external diameter of 3 mm., and give (at the temperature of 15° C.) 20 drops of distilled water per Gm.

For Analytical work this International drop is now *Off.* recognised. It is stated that at 15·5° C. 20 drops of water from the drop measure are equivalent to 1 millilitre.

We provide in Vol. II., a Drop Measure Table based on that in the Farmacopea Oficial Española, 1905. The French Codex also gives a very complete Table of this description.

The sizes of bottles in most frequent use in France are :—

1,000, 500, 250, 200, 125, 100, 50, and 25 cubic centimetres.

Mixtures may be prescribed in 125, 200, or 250 Cc., or where; it is desired to prolong the treatment 500 Cc. is a convenient size and drops should be ordered in quantities of 60, 30, and 15 Cc.

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Metric prescribing, it is stated, will replace the Imperial Method (but it is very slow in coming.—W.H.M.). There is a good exposition of the whole matter by W. C. Sillar.—L. i./22,469,492.

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* These quantities are respectively those recognised by the Fr. Cx. for a coffee spoonful (teaspoonful) and a tablespoonful (Cuillerée à Soupe).

According to the P. Belg.—

La cuillerée à café holds 4 Gm. of water.
La cuillerée à dessert holds 10 Gm. of water
La cuillerée à bouche ou à Soupe nolds 15 Gm. of water.
} as also in Fr. Cx.

Generally speaking:—

One teaspoon = 4 Cc.
One dessertspoon = 8 Cc.
One tablespoon = 15 to 16 Co.

METRIC WEIGHTS AND MEASURES AND THEIR EQUIVALENTS

1 Gramme (or Gram) (Gm.)	= 15·4323564 grains.
1 Centigramme (Cgm.)	= 0·154323 grain.
1 Milligramme (Mgm.)	= 0·015432 grain.
1 Litre	= 35·196 fluid ounces.
1 Cubic Centimetre (Cc.)	= 16·95 minims (nearly).
1 Metre	= 39·370113 inches.

The Gramme has its decimal multiples—Dekagramme, Hectogramme, and Kilogramme; and divisions—Decigramme, Centigramme, and Milligramme. The Litre and Metre have their corresponding decimal divisions—Decilitre, Centilitre, and Millilitre,—and Decimetre, Centimetre, and Millimetre.

In Continental States, where this system is now generally adopted for the dispensing and preparing of medicines, all liquids are weighed, and the terms Gramme, Centigramme, and Kilogramme only are used. This avoids the possibility of errors, which the similarity of the names Decagramme and Decigramme might lead to, but if the Greek prefix *deka* were always spelt with a *K* this possibility of error would not exist.

Furthermore, the quantities of the ingredients in prescriptions are sometimes written in decimal proportions, the gramme being understood to be the unit; the name of the integer is generally not mentioned, thus:

Rhubarb 35· means 35 grammes of Rhubarb
„ ·035 „ 35 milligrammes

The following abbreviations are officially used in all French educational establishments:—

Myriamétre, mam	Décistére, ds	Kilolitre, kl
Kilométre, km	tonne, t	Hectolitre, hl
Héctométre, hm	Quintal métrique, q	Dékalitre, dal
Dékamétre, dam	Kilogramme, kg	Litre, l
Métre, m	Hectogramme, hg	Décilitre, dl
Decimétre, dm	Dékagramme, dag	Centilitre, cl
Centimétre, cm	Gramme, g	Millilitre, ml
Millimétre, mm	Décigramme, dg	Hectare, ha
Dékastére, das	Centigramme, cg	Are, a
Stére, s or m^3	Milligramme, mg	Centiare, ca or m^2

APPROXIMATE EQUIVALENT WEIGHTS.

WEIGHTS, IMPERIAL TO METRIC.

grain	Gm.	grain	Gm.	grains	Gm.
$\frac{1}{1000}$	= 0·000065	$\frac{1}{4}$	= 0·016	15	= 1·0
$\frac{1}{200}$	= 0·0003	$\frac{1}{3}$	= 0·02	20	= 1·2
$\frac{1}{100}$	= 0·0006	$\frac{1}{2}$	= 0·03	30	= 2·0
$\frac{1}{64}$	= 0·001	$\frac{3}{4}$	= 0·05	45	= 3·0
$\frac{1}{50}$	= 0·0013	1	= 0·06	60	= 4·0
$\frac{1}{40}$	= 0·0015	grains		90	= 6·0
$\frac{1}{32}$	= 0·002	$1\frac{1}{2}$	= 0·1	120	= 8·0
$\frac{1}{25}$	= 0·0025	2	= 0·12	150	= 10·0
$\frac{1}{20}$	= 0·003	3	= 0·2	180	= 12·0
$\frac{1}{16}$	= 0·004	4	= 0·25	$\frac{1}{2}$ ounce	
$\frac{1}{12}$	= 0·005	5	= 0·3	(av.)	= 15·0
$\frac{1}{10}$	= 0·006	6	= 0·4	1 „	= 30·0
$\frac{1}{8}$	= 0·008	8	= 0·5	(or nearer 28·35.	
$\frac{1}{6}$	= 0·01	10	= 0·6	1 pound	
$\frac{1}{5}$	= 0·012	12	= 0·8	= 453·59	

WEIGHTS. METRIC TO IMPERIAL.

1	kilogramme	.. .. ..	= 2lb. $3\frac{1}{4}$ oz.
500	Gm.		= 1 „ $1\frac{5}{8}$ „
100	„		= $3\frac{1}{2}$ oz.
25	„		= $\frac{7}{8}$ „
10	„		= $\frac{1}{3}$ „
1	„		= 15·43 grains.
$\frac{1}{2}$	„ or 500 milligrammes ..		= 7·7 „

MEASURES. IMPERIAL TO METRIC.

minim	Cc.	minims	Cc.	fluid oz.	Cc.
$\frac{1}{2}$	= 0·03	15	= 1·0	1	= 30·0
1	= 0·06	20	= 1·2	fluid ozs.	
minims		25	= 1·5	2	= 60·0
2	= 0·12	30	= 2·0	4	= 115·0
3	= 0·2	40	= 2·5	5	= 140.0
4	= 0·25	45	= 3·0	6	= 170·0
5	= 0·30	60	= 4·0	8	= 230·0
6	= 0·4	90	= 6·0	10	= 280·0
8	= 0·5	120	= 8·0	20	= 568·0
10	= 0·6	240	= 15·0	gallon	litres.
12	= 0·8			1	= 4·536

MEASURES. METRIC TO IMPERIAL.

1	Cc.		= 15 (nearer 17) minims.
1	litre		= 1 pint 15 fl. oz. approx.

MEASURES OF LENGTH.

micromillimetre = $\frac{1}{1000000}$ millimetre, usually represented by $\mu\mu$.
1 micron = $\frac{1}{1000}$ millimetre, or 1 micrometre, „ „ μ.
1 millimetre = 0·039370 inch.
1 centimetre = 0·3937 inch.
1 decimetre = 3·937 inches
1 metre = 39·370113 inches or 1 yard 3·37 inches nearly,

PERCENTAGE AND GRAINS PER FLUID OUNCE EQUIVALENTS.

Where **Percentage Solutions** are mentioned, it is intended that 100 Cc. shall contain *n* Gm. or that 100 grain-measures of the finished solution shall contain *n* grains of the substance, *e.g.*, a 50 per cent. solution of Cocaine Hydrochloride will contain 50 Gm. in 100 Cc. or 50 grains in 100 grain-measures.

%	Grains per fluid ounce	%	Grains per fluid ounce	%	Grains per fluid ounce
10·0	43·75	4·5	19·7	1·4	6·1
9·5	41·56	4·0	17·5	1·3	5·7
9·0	39·4	3·5	15·3	1·2	5·25
8·5	37·2	3·0	13·1	1·1	4·8
8·0	35·0	2·5	10·95	1·0	4·4
7·5	32·8	2·0	8·75	0·9	3·95
7·0	30·6	1·9	8·3	0·8	3·5
6·5	28·45	1·8	7 9	0·7	3·05
6·0	26·25	1·7	7·45	0·6	2·6
5·5	24 05	1·6	7·0	0·5	2 2
5·0	21·9	1·5	6·55	0·4	1·75

NEUTRALISATION TABLE.

		Citric Acid grains.	Tartaric Acid. grains.
Ammonium Carbonate	10 grains neutralise	13	14
Magnesium Carbonate		14	16
Potassium Bicarbonate		7	7¾
Sodium Bicarbonate		8½	9
Sodium Carbonate ($+10\ H_2O$)		5	5¼

Lemon Juice (freshly expressed from *Citrus Medica var. B. Limonum*) contains from 30 to 40 grains Citric Acid per ounce. A good lemon yields on average an ounce of juice.

Arithmetical Memoranda.

Ratio of circumference of a circle to its diameter $= \pi = 3{\cdot}14159$. Circumference of a circle $= 2\ \pi\ r$. Area of a circle $= \pi\ r^2$.

Area of a Triangle with base a and height $h = \frac{1}{2}\ a\ h$.

Volume of a Cube with length $l = l^3$.

Volume of a Cylinder $= \pi\ r^2\ h$. If r and h be in inches, this divided be 277·278 the result is in gallons (water).

Volume of a Cone $= \frac{\pi\ r^2\ h}{3}$ Volume of a Sphere $= \frac{4}{3}\pi\ r^3$

A gallon of Water weighs 10 pounds; 1 gallon contains 277·278 cubic inches,

1 cub ft = 2 6·25 gallons

A '**Corbyn**' = 40 ounces fluid (1 quart).

A '**Winchester**' quart = 80 ounces fluid (¼ gallon).

Lead and Arsenic Calculations.

50 parts in 1,000,000 =
1 in 20,000 = 0·005%
100,000 whole
50 lead or arsenic

99,950 pure

1 in 20,000 = $\frac{7}{20}$ of a grain in 1 lb.

1%	= 1 in 100
0·1%	= 1 in 1,000
0·01%	= 1 in 10,000
0·001%	= 1 in 100,000
0·0001%	= 1 in 1,000,000
0·0050%	= 50 in 1,000,000

WATER ANALYSIS TRANSPOSITIONS.

To transpose grains per gallon into parts per million multiply by $\frac{100}{7}$

To transpose grains per gallon into parts per 100,000, multiply by $\frac{10}{7}$

To transpose parts per million into grains per gallon, multiply by $\frac{7}{100}$

To transpose parts per 100,000 into grains per gallon, multiply by $\frac{7}{10}$

RELATION OF VOLUME TO MASS (*Off.*).

1 minim = the volume at 16·7° C. of 0·9114583 grains of water.
1 fluid drachm = the volume at 16·7° C. of 54 6875 grains of water.
1 fluid ounce = the volume at 16·7° C. of 437·5 grains of water.
109·7143 minims (taken as 110 minims) = the volume at 16·7° C. of 100 grains of water.

The Authors would welcome any suggestions regarding the subject matter or arrangement of the work, from Medical Men, Pharmacists, or Analysts.

THERMOMETRIC EQUIVALENTS.

For temperatures below the freezing point of water:—

°C.	°F.	°C.	°F.	°C.	°F.	°C.	°F.	°C.	°F.
−	−	−	−	−	−	−	+	−	+
40	40·0	31	23·8	22	7.6	16	3.2	7	19·4
39	38·2	30	22·0	21	5·8	15	5·0	6	21·2
38	36·4	29	20·2	20	4·0	14	6·8	5	23·0
37	34·6	28	18·4	19	2·2	13	8·6	4	24·8
36	32·8	27	16·6	18	0·4	12	10·4	3	26·6
35	31·0	26	14·8	17·778	0·0	11	12·2	2	28·4
34	29·2	25	13·0			10	14·0	1	30·2
33	27·4	24	11·2	−	+	9	15·8	0	32·0
32	25·6	23	9·4	17	1·4	8	17·6		

For temperature above the freezing point of water:—

°C.	°F.	°C.	°F.	°C.	°F.	°C.	°F.	°C.	°F.
+	+	+	+	+	+	+	+	+	+
1	33·8	39	102·2	77	170·6	115	239·0	153	307·4
2	35·6	40	104·0	78	172·4	116	240·8	154	309·2
3	37·4	41	105·8	79	174·2	117	242·6	155	311·0
4	39·2	42	107·6	80	176·0	118	244·4	156	312·8
5	41·0	43	109·4	81	177·8	119	246·2	157	314·6
6	42·8	44	111·2	82	179·6	120	248·0	158	316·4
7	44·6	45	113·0	83	181·4	121	249·8	159	318·2
8	46·4	46	114·8	84	183·2	122	251·6	160	320·0
9	48·2	47	116·6	85	185·0	123	253·4	161	321·8
10	50·0	48	118·4	86	186·8	124	255·2	162	323·6
11	51·8	49	120·2	87	188·6	125	257·0	163	325·4
12	53·6	50	122·0	88	190·4	126	258·8	164	327·2
13	55·4	51	123·8	89	192·2	127	260·6	165	329·0
14	57·2	52	125·6	90	194·0	128	262·4	166	330·8
15	59·0	53	127·4	91	195·8	129	264·2	167	332·6
16	60·8	54	129·2	92	197·6	130	266·0	168	334·4
17	62·6	55	131·0	93	199·4	131	267·8	169	336·2
18	64·4	56	132·8	94	201·2	132	269·6	170	338·0
19	66·2	57	134·6	95	203·0	133	271·4	171	339·8
20	68·0	58	136·4	96	204·8	134	273·2	172	341·6
21	69·8	59	138·2	97	206·6	135	275·0	173	343·4
22	71·6	60	140·0	98	208·4	136	276·8	174	345·2
23	73·4	61	141·8	99	210·2	137	278·6	175	347·0
24	75·2	62	143·6	100	212·0	138	280·4	176	348·8
25	77·0	63	145·4	101	213·8	139	282·2	177	350·6
26	78·8	64	147·2	102	215·6	140	284·0	178	352·4
27	80·6	65	149·0	103	217·4	141	285·8	179	354·2
28	82·4	66	150·8	104	219·2	142	287·6	180	356·0
29	84·2	67	152·6	105	221·0	143	289·4	181	357·8
30	86·0	68	154·4	106	222·8	144	291·2	182	359·6
31	87·8	69	156·2	107	224·6	145	293·0	183	361·4
32	89·6	70	158·0	108	226·4	146	294·8	184	363·2
33	91·4	71	159·8	109	228·2	147	296·6	185	365·0
34	93·2	72	161·6	110	230·0	148	298·4	186	366·8
35	95·0	73	163·4	111	231·8	149	300·2	187	368·6
36	96·8	74	165·2	112	233·6	150	302·0	188	370·4
37	98·6	75	167·0	113	235·4	151	303·8	189	372·2
38	100·4	76	168·8	114	237·2	152	305·6	190	374·0

Thermometric Equivalents—*continued.*

°C.	°F.	°C.	°F.	°C.	°F.	°C.	°F.	°C.	°F.
+	+	+	+	+	+	+	+	+	+
191	375·8	213	415·4	235	455·0	257	494·6	279	534·2
192	377·6	214	417·2	236	456·8	258	496·4	280	536·0
193	379·4	215	419·0	237	458·6	259	498·2	281	537·8
194	381·2	216	420·8	238	460·4	260	500·0	282	539·6
195	383·0	217	422·6	239	462·2	261	501·8	283	541·4
196	384·8	218	424·4	240	464·0	262	503·6	284	543·2
197	386·6	219	426·2	241	645·8	263	505·4	285	545·0
198	388·4	220	428·0	242	467·6	264	507·2	286	546·8
199	390·2	221	429·8	243	469·4	265	509·0	287	548·6
200	392·0	222	431·6	244	471·2	266	510·8	288	550·4
201	393·8	223	433·4	245	473·0	267	512·6	289	552·2
202	395·6	224	435·2	246	474·8	268	514·4	290	554·0
203	397·4	225	437·0	247	476·6	269	516·2	291	555·8
204	399·2	226	438·8	248	478·4	270	518·0	292	557·6
205	401·0	227	440·6	249	480·2	271	519·8	293	559·4
206	402·8	228	442·4	250	482·0	272	521·6	294	561·2
207	404·6	229	444·2	251	483·8	273	523·4	295	563·0
208	406·4	230	446·0	252	485·6	274	525·2	296	564·8
209	408·2	231	447·8	253	487·4	275	527·0	297	566·6
210	410·0	232	449·6	254	489·2	276	528·8	298	568·4
211	411·8	233	451·4	255	491·0	277	530·6	299	570·2
212	413·6	234	453·2	256	492·8	278	532·4	300	572·0

EQUIVALENTS WITHIN CLINICAL LIMITS.

°C.	°F.	°C.	°F.	°C.	°F.	°C.	°F.	°C.	°F.
35·0	95·0	36·9	98·42	38·8	101·84	40·7	105·26	42·6	108·68
35·1	95·18	37·0	98·60	38·9	102·02	40·8	105·44	42·7	108·86
35·2	95·36	37·1	98·78	39·0	102·20	40·9	105·62	42·8	109·04
35·3	95·54	37·2	98·96	39·1	102·38	41·0	105·80	42·9	109·22
35·4	95·72	37·3	99·14	39·2	102·56	41·1	105·98	43·0	109·40
35·5	95·90	37·4	99·32	39·3	102·74	41·2	106·16	43·1	109·58
35·6	96·08	37·5	99·50	39·4	102·92	41·3	106·34	43·2	109·76
35·7	96·26	37·6	99·68	39·5	103·10	41·4	106·52	43·3	109·94
35·8	96·44	37·7	99·86	39·6	103·28	41·5	106·70	43·4	110·12
35·9	96·62	37·8	100·04	39·7	103·46	41·6	106·88	43·5	110·30
36·0	96·80	37·9	100·22	39·8	103·64	41·7	107·06	43·6	110·48
36·1	96·98	38·0	100·40	39·9	103·82	41·8	107·24	43·7	110·66
36·2	97·16	38·1	100·58	40·0	104·0	41·9	107·42	43·8	110·84
36·3	97·34	38·2	100·76	40·1	104·18	42·0	107·60	43·9	111·02
36·4	97·52	38·3	100·94	40·2	104·36	42·1	107·78	44·0	111·20
36·5	97·70	38·4	101·12	40·3	104·54	42·2	107·96		
36·6	97·88	38·5	101·30	40·4	104·72	42·3	108·14		
36·7	98·06	38·6	101·48	40·5	104·90	42·4	108·32		
36·8	98·24	38·7	101·66	40·6	105·08	42·5	108·50		

The Reaumur scale (with zero at freezing point of water and the boiling point of water being 80°) is now little used.

To convert a temperature in Centigrade into Fahrenheit multiply by $\frac{9}{5}$ and add 32.

Conversely, to transpose Fahrenheit into Centigrade subtract 32 and multiply by $\frac{5}{9}$.

To convert Centigrade into Reaumur multiply by $\frac{4}{5}$.

To convert Reaumur into Centigrade multiply by $\frac{5}{4}$.

To convert Fahrenheit into Reaumur subtract 32 and multiply by $\frac{4}{9}$.

To convert Reaumur into Fahrenheit multiply by $\frac{9}{4}$ and add 32.

INTERNATIONAL, 1922, ATOMIC WEIGHTS.

The Molecular Weights of Compounds in our work are now given throughout in terms of the following Atomic Wts.

The figures include the 1920 alterations, also the 1922 Atomic Weights as detailed in ' Premier Rapport de la Commission Internationale des Eléments Chimiques, 1923, Paris.

		I. Wts. O=16.
Aluminium	Al	27·0
Antimony	Sb	120·2
Argon	A	39·9
Arsenic	As	74·96
Barium	Ba	137·37
Bismuth	Bi	208·0
Boron	B	10·9
Bromine	Br	79·92
Cadmium	Cd	112·4
Cæsium	Cs	132·81
Calcium	Ca	40·07
Carbon	C	12·005
Cerium	Ce	140·25
Chlorine	Cl	35·46
Chromium	Cr	52·0
Cobalt	Co	58·97
Columbium	Cb	93·1
Copper	Cu	63·57
Dysprosium	Dy	162·5
Erbium	E	167·7
Europium	Eu	152·0
Fluorine	F	19·0
Gadolinium	Gd	157·3
Gallium	Ga	70·1
Germanium	Ge	72·5
Glucinum	Gl	9·1
Gold	Au	197·2
Helium	He	4·0
Holmium	Ho	163·5
Hydrogen	H	1·008
Indium	In	114·8
Iodine	I	126·92
Iridium	Ir	193·1
Iron	Fe	55·84
Krypton	Kr	82·92
Lanthanum	La	139·0
Lead	Pb	207·2
Lithium	Li	6·94
Lutecium	Lu	175·0
Magnesium	Mg	24·32
Manganese	Mn	54·93
Mercury	Hg	200·6
Molybdenum	Mo	96·0
Neodymium	Nd	144·3
Neon	N	20·2
Nickel	Ni	58·68
Niton (Ra Emanation)	Nt	222·4
Nitrogen	N	14·008
Osmium	Os	190·9
Oxygen	O	16·00
Palladium	Pd	106·7
Phosphorus	P	31·04
Platinum	Pt	195·2
Potassium	K	39·1
Praseodymium	Pr	140·9
Radium	Ra	226·0
Rhodium	Rh	102·9
Rubidium	Rb	85·45
Ruthenium	Rn	101·7
Samarium	Sa	150·4
Scandium	Sc	45·1
Selenium	Se	79·2
Silicon	Si	28·1
Silver	Ag	107·88
Sodium	Na	23·0
Strontium	Sr	87·63
Sulphur	S	32·06
Tantalum	Ta	181·5
Tellurium	Te	127·5
Terbium	Tb	159·2
Thallium	Tl	204
Thorium	Th	232
Thulium	Tm	168·5
Tin	Sn	118·7
Titanium	Ti	48·1
Tungsten	W	184 0
Uranium	U	238·2
Vanadium	V	51·0
Xenon	X	130·2
Ytterbium	Yb	173·5
Yttrium	Yt	89·33
Zinc	Zn	65.37
Zirconium	Zr	90.6

Isotopes.—Contrary to the Atomic Theory of Dalton that atoms of the same element are similar to one another and equal in weight, the view now is that there must exist elements having chemical properties identical for all practical purposes but the atoms of which have different weights.

ACACIÆ GUMMI (*Off.*).

Syn. Acacia U.S. IX., Gomme Arabique, Gomme du Sénégal, Fr. Cx.

A gummy exudate from A. Senegal, *Willdenow* (*N.O. Leguminosæ*), and other species, either colourless or with yellowish tint.

The gum consists, in the main, of a mixture of Alkali Arabinates.

Soluble almost completely in water; insoluble in Alcohol.

Impurities and fraudulent additions. Ash Limit (*Off.* and U.S.) not to exceed 4%. It must be free from Starch, Dextrin, Sugars and Tannin.

Kordofan Gum contains 12 to 15% moisture, while Gum Senegal contains rather more. If the amount exceeds 20%, the gum, instead of being brittle is tough and difficult to grind to powder.

The optical rotation of good gum is usually slightly lævorotatory.

Acidity of Gum Acacia.

Contradictory statements as to the reaction of a solution of Gum Acacia, led us (Jan. 1924), to examine half-a-dozen commercial samples of Gum Acacia and powdered Gum.

All the samples were found to give an acid solution, the amount of Sodium Hydroxide required to neutralise 1000 Gm. of Gum varying from 2·48 to 3·2 Gm., giving an average of 2.84 Gm. It is of interest to note that the clarity of the solution is in no way related to its reaction.

A sample of Mucilage two months old showed that in a sterile solution (this having been preserved with Benzoic Acid), relatively no hydrolysis of the component salts had occurred.

As ***emulsifying agent*** for oils, Powdered Gum Acacia is used, *e.g.*, in Mistura Olei Ricini (*Off.*), the usual proportion being about 1 of Gum to 4 of oil. Less suffices in some cases. For suspending resinous ingredients of Tinctures *vide* Tinctures. For its use as a pill excipient *vide* Pilulæ.

Mucilago Acaciæ. (*Off.*)—Gum Acacia 4, washed to remove any adherent dust, dissolved in water 6. This quantity measures about $8\frac{3}{4}$. Benzoic Acid 0·1% added will keep it.

Incompatibles.—Alcohol, Mineral Acids, Borax, Ferric Salts, Oxalic Acid and most Lead Salts. Bismuth Carbonate should not be suspended with Acacia Mucilage. Tragacanth answers better.

The ***Straining of Mucilage*** can be effected by forcing it through muslin by air expansion. A bottle about half full of Mucilage is tied lightly over the neck with muslin, thoroughly cooled, and then on bringing into a warm situation and inverting, the Mucilage will be forced through. When it ceases to drop, the process of alternate heating and cooling is repeated. To obtain an absolutely bright Mucilage the process might be reversed, making the bottle (above)—previously heated—the receiver.—P.J. ii./09,6.

Mucilago, U.S. Contains Gum Acacia 34, Lime Water 33, Water to 100. The alkali is a useful addition.

Syrupus Acaciæ, U.S. Acacia 10, Sugar 80, Water to 100.

Potion Gommeuse. Fr. Cx. Gum Acacia Powder 1, Syrup 3, Orange Flower Water 1, Water 10, parts by weight.

Gum Acacia Solution for Intravenous Injection. *Syn.* Solutio Salina cum Acacia, U.C.H. and St. Th. H. (6% Gum); Injectio Salinæ et Gummi Acaciæ, R.N.H. (7% Gum).

Gum Acacia 70 Gm., Sodium Chloride 9 Gm., Water to 1 litre. (Distilled Water is not essential except for bacteriological reasons.) The solution to be sterilised after straining through fine linen. The addition of any antiseptic is not desirable.

Gum Acacia Sterules are prepared.

The contents of one Sterule, diluted to 250 Cc. with boiled water, produces a 7% injection in Normal Saline.

Uses.—To raise blood pressure after loss of blood, *e.g.*, from a wound of the femoral artery. Many such cases could be saved if the blood pressure could be kept up for 24 hours or so. The solution has the same viscosity as the blood and a content of colloids with osmotic pressure equal to that of the blood. Hence after its injection there is little tendency for water to pass into the tissues.

In certain conditions the permeability of the blood vessels is increased in such a way that blood plasma itself escapes without the corpuscles. In others, water alone escapes, leaving proteins in addition to the corpuscles. In the former the blood requires diluting with a solution having the viscosity of blood plasma, not that of the whole blood. **Dextrin** 2·5% has viscosity rather less than that of the plasma, while its osmotic pressure is rather higher than that of blood colloids. The concentration might well be higher than 2·5% clinically.—Sir W. M. Bayliss, B.M.J. i./17,564.

Even 2% of Gum has properties superior to the salts alone. Solutions of 5% or over will restore permanently the low arterial pressure due to loss of blood.—Sir W. M. Bayliss, B.M.J. ii./17,808; i./19,262.

The blood vessels are impermeable to colloids, so that their osmotic pressure is effective in retaining within the circulation the solution injected. May be used in large quantities.—Sir W. M. Bayliss, Jl. Ph. & Exp. Ther., Mar. 1920 p. 29.

Shock from wounds well treated by the method (6% solution).—Sir W. M. Bayliss, B.M.J. i./18, 553.

Gelatin 2% has also been suggested.—Med. Res. Counc. B.M.J. i./17,383.

Surgical shock treated by intravenous infusion of 1 to 1½ pints Normal Saline containing 3% Gum Acacia and 1% Glucose. Surgery at advanced operating centre.—C. F. M. Saint, B.M.J. i./18,473.

The balance of Colloid and Crystalloid in cholera, shock and allied conditions —B. Moore, B.M.J. ii./19,490.

The use of saline solutions intravenously. The increase in blood volume caused, enables the heart to send on a large volume. When the total volume of blood is deficient the tissues suffer from want of Oxygen though the blood may be of normal constitution. Normal Saline was first proposed, but it disappears from the circulation in 20 to 30 minutes. A colloid with an osmotic pressure equal to that of the blood colloids must be added. Good gum answers the purpose well.—Sir W. M. Bayliss, L. i./23,575.

Gum infusion versus blood transfusion.—Evidence asked for efficacy of this substitute for the physiological remedy.—L. i./22,754. (*Cf.* **Blood Transfusion.**)

Deleterious effects of Gum Acacia for transfusion. Stated not to improve chance of recovery of animals which have been subjected to "Standard hæmorrhage."—Jl.Am.Ph.A. '22/387.

Acacia Gum Glucose Injections.—Intravenously, influence urine excretion and blood volume in rabbits. Gum Acacia is capable of maintaining the blood volume in spite of marked Glucose diuresis. Glucose injections without Gum Acacia produce a diminution of the blood volume.—P. M. Mattill, Katherine Mayer and L. W. Sauer, Jl. Ph. & Exp. Ther., Dec. 1920.

Ghatti Gum is from *Anogeissus latifolia* (*N.O. Combretaceæ*)—used technically chiefly.

Mucilago of this is *Off.* 1 to 3 of water.

Acacia Arabica (*Willd.-Babul*). A moderate sized to large tree in the drier parts of the plains of India. The bark is used for tanning, the pods for fodder and tanning. Heavily worked since the war.—Am. J. Ph., '18,37.

The function of Gum in official Acacias is no doubt to preserve for the plants

he moisture necessary to keep them alive during the months of drought—December to April. The cicatrisation of the wounds, in collecting, is of econdary importance, the gum being exuded only during periods of extreme iryness,the process stopping with the slightest rain.—E. Perrot, P.J. ii/20,510

100 tons of Gum Acacia stated to be available annually in the forests of Argentina.—Jl. Am. Ph. A., '20/1118.

Sheep poisoned and killed by eating the pods of *Robinia pseud-acacia*, the ommon garden "acacia" tree.—P.J. i./23,263.

ACETANILIDUM (*Off.*).

Syn. ANTIFEBRIN, PHENYLACETAMIDE.

$CH_3CO.NH.C_6H_5 = 135{\cdot}12$.

Dose.—2 to 5 grains (**0·12 to 0·3 Gm.**) Maximum single dose 8 grains (**0·5 Gm.**); Max. daily dose 23 grains (**1·5 Gm.**). May be given in cachets or suspended by compound tragacanth powder.

Prepared by the action of glacial acetic acid on aniline. In small white odourless glittering crystals with M. Pt. 113°C., which produce a burning sensation on the tongue.

Antidotes.—Emetics, Inhalation of Ether and Oxygen, Stimulants—*e.g.*, Strychnine hypodermically, warmth to feet and body.

Soluble 1 in 210 of water, slightly in glycerin, 1 in 4·2 of alcohol 90%, 1 in 20 of brandy with difficulty; easily in chloroform, benzol and ether.

Pharmacology.——The anilides, *e.g.*, Acetanilide and Phenacetin, owe their activity in part to the fact that they are only slowly hydrolysed in the organism with liberation of the parent base.—O. C. M. Davis, B.M.J. ii./22,11.

Uses.—As a febrifuge and antipyretic, hypnotic sedative, anti epileptic, anti-arthritic, and nervine tonic. Checks the chills and fever of phthisis, quiets the nervous system, and is useful in typhoid. Relieves sciatica and the darting pains of locomotor ataxy.

Wounds (amputations, also injuries to limbs by accidents) have been treated by acetanilide as a dusting powder. 25 years' experience of its antiseptic use. Employ Hydrogen Peroxide first. Could be used in war without fear of suppuration. Syphilitic sores have been similarly dressed.—E. F. Greene, B.M.J. i/15, 928.

Tablets, 3 grains (**0·2 Gm.**). *Dose.*—1 or more.

Also made **with Caffeine,** 1 grain; useful in migraine.

Slipule No. 1 holds 5 grains (**0·3 Gm.**)

Effervescent Acetanilide. *Dose.*—1 drachm.

In two strengths, 1 and 3 grains in 1 drachm.

Pulvis Acetanilidi Compositus, U.S. VIII. (*not now in U.S.*).

Dose.—3 to 5 grains (**0·2 to 0·3 Gm.**).

Acetanilide 7, Caffeine 1, Sodium Bicarbonate 2.

Elixir Acetanilidi Compositum.

Dose.—$\frac{1}{2}$ to 1 drachm (**2 to 4 Cc.**).

Acetanilide 326 grains, Caffeine 32 grains, Nux Vomica Tincture 256 minims, Aromatic Spirit of Ammonia 8 ounces, Aromatic Elixir to 16 ounces. Filter with aid of Talc 120 grains. For headache.

For deaths from and risks with Acetanilide; Tests for Acetanilide, also use of Acetanilide in the form of 'TUBES TEMOINS' *to determine efficient sterilisation of Dressings, see Vol. II.*

✱**Ammonol** (T.M. 204599).

Dose.—5 to 10 grains (**0·3 to 0·6 Gm.**).

A white powder, containing Acetanilide, Sodium Bicarbonate and Ammonium Carbonate. **Tablets** 5 grains. Relieves dysmenorrhœa.

Ammonol Salicylate is also made.

✱**Phenalgin.** (T.M. 221616). *Dose.*—5 to 20 grains (**0·3 to 1·2 Gm.**).

A mixture with Antifebrin as the active base, as an antipyretic and hypnotic. **Tablets and Gelatin (Hard) Capsules,** 5 grains.

Caution.—

A rough analysis of Phenalgin was found to give Acetanilide 60%, Sodium Bicarbonate 25%, Ammonium Carbonate 15%. Incompatible with Calome l and Aspirin, *e.g.*, in the prescription: Calomel ½ grain, Aspirin 10 grains, Phenalgin 5 grains. On adding to water (or by deliquescence), Sodium and Ammonium Aceto-salicylate are formed and the solution is acid. If any Ammonium Mercuric Chloride is formed this is attacked by the free Aspirin with formation of Ammonium Aceto-salicylate and Mercuric Chloride. Dangerous interaction may occur. Aspirin and Alkali Carbonates cannot co-exist in the same powder.—J. Noble, P.J.i./22,151; C.D., Feb. 25/22,235.

Methylacetanilide. *Syn.* ✱EXALGINE. (T.M. 90208). FR. CX. $C_6H_5N(CH_3)CH_3CO$=149·141.

Dose.—½ to 2 grains (**0·03 to 0·12 Gm.**) in pill. In colourless crystals, with a slight saline taste.

Soluble 1 in 60 of water, freely so in alcohol.

Mistura Exalgine. *Dose.*—2 to 4 drachms (**8 to 15 Cc.**) Exalgine 1, Tincture of Orange 4, Syrup of Orange-Flower 12, Water to 100.

Tabellæ Exalgine—½ grain (**0·03 Gm.**) each, with chocolate.

An analgesic, anti-neuralgic, antipyretic (only in unsafe doses). Toxic doses cause paralysis of respiratory organs.

Incompatible with salicylic acid.

ACETONUM (*Off.*), U.S., P.Jap. iv.

Syn. DIMETHYL-KETONE. $CH_3CO.CH_3$=58·063.

Dose.—60 to 90 minims (**4 to 6 Cc.**) daily.

A clear, colourless, light, inflammable, neutral liquid, with ethereal odour and camphoraceous taste, contained in crude wood spirit, obtained by the dry distillation of acetates. It is miscible with water, alcohol, ether, chloroform, and oils, and is a ready solvent of fats and resins, pyroxylin, celluloid and many other organic substances. It takes up about 25 times its volume of acetylene. If pure, its Sp. Gr. is 0·795 to 0·8. B. Pt. 56·5°C. It is largely employed in the manufacture of chloroform.

It occurs in small quantity as a normal constituent in the urine, also (frequently in large amount) in that of diabetics, *cf. Vol. II.*

Antiseptic Power.—*This we have determined using B. Coli Communis as test organism.—See Chapter on Antiseptics, Vol. II.*

Pharmacology.—It is particularly potent when a number of just active doses are given; inhibits respiration and heat and produces fall of blood pressure.—J.C.S.A. i./1922, 794.

Acetone Bacillus. Fermentation of Starch under aseptic precautions and the separation of the two main liquid products Butyl Alcohol and Acetone by fractionation. A use is wanted for Butyl Alcohol in peace time.—B.M.J. i./22,115.

Uses.—Acetone has been employed in dyspnœa in above dose daily. It has also been given as an anthelmintic, and for cleansing the skin prior to operation.

Inoperable cancer of the uterus treated by Acetone, the idea being to harden the surface of the cancer so checking the discharge until the escharotic portion is cast off. The free surface can then be again treated. From ½ to 1 ounce is used at a time, being poured into the wound through a Ferguson's Speculum. Pelvis of the patient is raised as in the Trendelenburg position. The application lasts 15 to 20 minutes.—Pr. Feb./09,290. Does not cure but makes the life of the patient endurable.—B.M.J.E. i./10,8.—Pr. June, 1910, p. 778.

It checks hæmorrhage, lessens discharge and fœtor. It is not absorbed. The part is first thoroughly curetted. It is well to coat the vulva and vagina with a layer of soft paraffin After the treatment with acetone the speculum is withdrawn, the cavity swabbed out and packed for 4 hours with a tampon coated with soft paraffin. The next application of acetone is in 5 or 6 days and then twice or thrice weekly. Contraindicated when the disease is so far advanced that an opening has formed into the rectum, peritoneal cavity or bladder.—L. ii./11,1784.

Iodo-Acetone.

Iodine 2% in Acetone is used to sterilise catgut. First steep in ligroin to free from fat.—L. i./06,1193, 1366. *Vide* also Iodised gut.

Acetophenone. *Syn.* HYPNONE. $C_6H_5CO.CH_3$=120·079.

Dose.—1½ to 5 minims (**0·1 to 0·3 Cc.**) in almond emulsion, or with mucilage or syrup and peppermint water, or in **Capsules** containing ⅓ minim. A colourless liquid, with odour of Bitter Almonds. Insoluble in water, but soluble in alcohol and oils. Used as an hypnotic requires care.

ACIDUM ACETICUM.

Acidum Aceticum Glaciale (*Off.*). Contains 98·9% Hydrogen Acetate. $CH_3.COOH$=60·04. Sp. Gr. 1·058.

A colourless liquid or crystals melting at about 14·7° C.

Uses.—Is not given internally. It is applied to corns and warts. Has caustic action, but gives much pain.

Psoriasis of a chronic type cured in a week or two by Glacial Acetic Acid locally—caused a certain amount of smarting at the time, but not severe.—B.M.J. ii./12,1214.

Antidotes.—Chalk and water, alkalis, magnesia, washing soda, and then demulcents such as olive or almond oil, milk, or white of egg.

Acidum Aceticum (*Off.*), 33%.

Dose.—5 to 15 minims (**0·3 to 1 Cc.**).

This has Sp. Gr. 1·044. P. AUSTR. and P.G.V. designate this acid 'Dilutum.'

A product of the destructive distillation of wood and of the oxidation of ethylic alcohol.

Incompatibles.—Alkalis. (Hydrates, Carbonates, etc.)

Use.—Externally for ringworm.

Acidum Aceticum Dilutum (*Off.*), 5%.

Dose.—½ to 1 drachm (2 to 4 Cc.).

Sp. Gr. 1·007. (FR. Cx. is 10%).

Uses.—May be given as an antidote to poisoning by alkalis, and largely diluted is applied as a lotion for inflamed joints, &c., and to

bathe the skin as a refrigerant in cases of fever. Has been taken to reduce obesity, but is not to be recommended.

Cancer of the cervix uteri has been treated by douching twice daily with weak solution of Acetic Acid. A patient kept fairly well for many years.

Lotio Acidi Acetici R.O.H. Diluted Acetic Acid 6, Water to 100. Has been used to relieve itching and irritation, *e.g.*, in spring catarrh.

Acetum. *Syn.* VINEGAR. Contains about 4% of acetic acid. Varieties are those made from Malt and from White Wine, but it is also made by diluting Acetic Acid and colouring with burnt sugar.

Acidum Pyrolignosum Crudum. A brown acid liquid, the product of destructive distillation of wood. Contains Acetic Acid 5 to 13% according to the kind of wood used, also other acids — Propionic, Butyric, etc., also small quantities of Methyl Alcohol, Furfural, Pyridine, Creosote and Resins. Has been employed locally to gangrene and has veterinary uses. It has antiseptic and preservative properties, *e.g.*, fresh meat dipped in it will keep for months.

Acidum Pyrolignosum Rectificatum.

Contains about 5% Acetic Acid. A yellowish liquid becoming darker on keeping, prepared from the above by fractional distillation, employing the first 80% passing over. Is occasionally ordered diluted 5 to 10% in mouth-washes and gargles.

Acetic Anhydride. $(CH_3CO)_2O = 102{\cdot}068$.

A colourless liquid with powerful acetic odour. Sp. Gr. 1·080. B. Pt. 138° C. Made by distilling acetyl chloride with an alkaline acetate. Tests 95 to 98% pure, the rest being acetic acid. Not employed medicinally to any extent, but chemically, *e.g.*, in the process of acetylation. Should be free from Hydrochloric Acid.

A Further Method of Manufacture.—British Patent 137701. By interaction of Anhydrous Sodium Acetate and Carbonyl Chloride, thus $2CH_3.COONa + COCl_2 = (CH_3.CO)_2O + CO_2 + NaCl$—J.C..S.A. i./20,287

Acetic Anhydride acting on solid Uranium Nitrate produces Nitrogen Peroxide.—P.J. ii./11,593.

Acetyl Chloride. $CH_3COCl = 78{\cdot}494$.

Manufacture.—By combining carefully Glacial Acetic Acid 130, with Phosphorus Pentachloride 137. Finally, distil and redistil the fraction passing over below 60°C—this separates from phosphorus oxychloride. A volatile liquid with intensely penetrating odour, boiling at 51° C.

Acidum Amido-Aceticum.—*Syn.* GLYCOCOLL, GLYCINE.

$CH_2.NH_2.COOH = 75{\cdot}058$.

Dose.—10 to 30 grains (**0·6 to 2 Gm.**) suggested.

White crystals with sweet taste, ***soluble*** in water 1 in 4½, slightly in alcohol, not in ether. M. Pt. 234° C.

Manufactured synthetically by heating monochloracetic acid 1 with ammonium carbonate 3. to about 65° C., and finally to 130° C. Dissolve the residue in water, boil with lead oxide to remove ammonia, filter and remove the lead from the filtrate with Sulphuretted Hydrogen and evaporate to crystallise.

It is both acidic, by reason of its acid group, and basic by reason of its amido grouping. It forms double salts with soluble metallic chlorides and nitrates.

The Amino-Acids are diuretic—they are decomposed by the liver with formation of urea. Gycocoll used as such is non-toxic and is not unpleasant to take. Experiments on healthy individuals showed decided increase in the output of urine under daily doses of 5 Gm.; Sp. Gr. remaining the same, also increase in Chlorides excreted. Clinically there was marked increase in the amount of urine excreted. In some cases good results by the use of Glycocoll with Digitalis.—P.J. ii./11,499.

The name "Glycin,"* though applied in Chemistry to this body, was given (P.J. i./07,208) to *p*-oxy-phenyl-amido-acetic Acid $C_6H_4OH.NH CH_2.COOH.=167{\cdot}12$. Stated to be *Soluble* about 1 in 30 water, but we could not confirm this. A saturated solution made in the cold yields residue corresponding to solubility of 1 in 400. A boiled solution on the other hand yields residue=1 in 30 pointing apparently to decomposition. Used in photography as a developer.

For further consideration of AMINO-ACIDS *see Vol. II.*

Hydrargyri Amido-acetas. *Syn.* **Hydrargyrum Glycocoll,** $(C_2H_4NO_2)_2Hg=348{\cdot}70$. *Dose.*—1/6 grain (**0·01 Gm.**) hypodermically. Manufactured by dissolving freshly made mercuric oxide in the acid. Used in syphilis.

Betaina. *Syn.* TRIMETHYL-GLYCOCOLL. $C_5H_{11}NO_2=117{\cdot}121$.

Preparation.—Betaine occurs in *beets and marigolds* (especially *un*ripe roots). Boil Beet Molasses diluted with water 12 hours with Barium Hydroxide, remove excess of Barium with Carbon Dioxide, filter and evap. Extract with Alcohol, concentrate the Alcoholic Liquor and add an Alcoholic Solution of Zinc Chloride. Filter off the precipitate, purify by recrystallising from water and precipitate with Barium Hydroxide. The liquid filtered from precipitated Zinc Oxide contains Barium Chloride. Precipitate exactly with Sulphuric Acid. By evaporating Betaine Hydrochloride crystallises out.

It is formed on oxidation of Choline (a non-poisonous syrupy fluid, *v.* also *Vol. II.*), $HO.N(CH_3)_3C_2H_4.OH.=121{\cdot}153$. A decomposition product of Lecithin. Betaine has been found in a number of vegetable and animal substances.

Muscarine and Neurine are allied bodies.

Choline Borate $C_5H_{15}NO_2.H_3BO_3=183{\cdot}077$.

Commercially a 10% Aqueous Solution under the name **Enzytol**, was given intravenously and intramuscularly in cancer.

The Choline was to be the synthetic variety, free from Neurine or might prove toxic.

Choline Borate, Salicylate, Iodo-benzoate, etc. solutions, relatively non-poisonous—subject of patent 8031/1914, see J.C.S.A. i./20,18.

Choline has been isolated from washed portions of rabbits', dogs' and cats' intestine. It has the power of stimulating intestinal movements. Acetyl-choline is even more active in stimulating peristalsis.—Le Heux, Pfluger's Archiv. 1919, p. 8, per Pres., Oct.,'20,361.

Neurine is chemically Trimethyl-Vinyl-Ammonium Hydroxide. $N.(CH_3)_3(C_2H_3)OH=103{\cdot}137$.

A ptomaine resulting as a decomposition product of meat. Highly poisonous. Hygroscopic. Commercially a 25% solution is prepared. Gehe mentions 3 to 6% aqueous solution as being used to paint diphtheritic membrane.

Betainæ Hydrochloridum.— *Syn.* ✱ ACIDOL. (T.M. 263431 and 317296.) $C_5H_{11}NO_2.HCl=153{\cdot}589$.

Dose.—1 to 8 grains (**0·06 to 0·5 Gm.**)

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*NOTE.—This was a Trade Mark (222,387). The registration was 'avoided,' under the Patents, Designs and Trade Marks (Temporary Rules) Act 1914.

Manufacture.—Patented method from Molasses, etc. :—

The usual method of manufacture is based on the formation of the Hydrochloride by passing gaseous Hydrochloric Acid into the Molasses—left over after separation of the crystallisable bodies. The method in this patent, No. 11,351 of 1912, is stated to be based on accurate knowledge of the conditions under which Betaine Hydrochloride and the other Chlorides formed are soluble.—P.J. ii /12,552. See also C.D. i./10,423.

White crystalline substance soluble in water 1 in 2 ; in alcohol about 1 in 20.

Uses.—Liberates hydrochloric acid (almost 25% of its weight), and is given with pepsin or well diluted with water in gastric affections.

Flavoring.—Glyl Rosæ, Glyl Menthæ Piperitæ, Syl Caryophylli; Syrupus Aurantii.

Acetamide. $CH_3.CO.NH_2 = 59{\cdot}058$.

Deliquescent crystals M.Pt. 82° C., made by interaction of Ammonia and Acetyl Chloride.

As a denaturant (½%) of Alcohol has been used *e g* in Phenacetin manufacture.

Acetamide or Formamide, either molten or in solution, used in extracting drugs.—F. Bayer & Co.'s Patent.—P.J.ii./22,295.

ACIDUM BENZOICUM (*Off.*).

Syn. Benzoyl Hydrate. $C_6H_5.COOH = 122{\cdot}083$.

Dose.—5 to 15 grains (**0·3 to 1 Gm.**).

Manufactured either from Gum Benzoin or from Toluol, the former being the more expensive.

Soluble, if pure, 1 in 400 of water ; 1 in 3 of alcohol 90% ; 1 in 7 of chloroform : and very soluble in fats, oils, alkaline solutions (forming benzoates), and in glycerin about 1 in 30.

Incompatible with Ferric Salts and Mercuric Chloride.

Uses.—Benzoic acid is an antiseptic, a stimulating expectorant, antipyretic and diuretic. It is given in cases of chronic cystitis, urinary calculi and incontinence, also for rheumatism, further in large doses in phthisis, diphtheria, tonsillitis and scarlet fever. It prevents fats becoming rancid, as in Adeps Benzoatus, *q.v.*

Four grains of Benzoic Acid with 1 grain of Canada Balsam, or 1 minim of glycerin, make a good pill.

A one in 20 solution in alcohol relieves urticaria, and, as an **Antiseptic Lotion** or **Gargle**, 1 dissolved in 500 of water is employed, or it may be suspended with glycerin if more than will dissolve.

15 to 20 grains every hour or 2 hours has specific remedial action in acute rheumatism, but is much weaker than Sodium Salicylate. —R. Stockman, B.M.J. i./13,597.

For use as preservative in Foods, etc., see Vol II:

Tablets, Compound, *v. Index.*

Benzoin.—There are two varieties known as Siam and Sumatra, the former being the best. Sumatra Benzoin is *Off.* if at least 85% soluble in alcohol 90%. *For source of Siam Benzoin, see Vol. II.*

Tinctura Benzoini Composita (*Off.*). *Syn.* Friars' Balsam, Traumatic Balsam.

Dose.—½ to 1 drachm (**2 to 4 Cc.**), with yolk of egg. U.S. has approximately same composition as *Off.*

A drachm to a pint of hot water is valuable as an inhalation in acute laryngitis. Undiluted it is used as a wound dressing.

For origin of Friars' Balsam, see Vol. II.

Tinctura Benzoini Simplex.

Dose.—½ to 1 drachm (**2 to 4 Cc.**).

One in 10 of Alcohol (90%). One in Rose Water 40, useful as a face lotion in urticaria and in irritable conditions of the skin.

Sphygmographic Varnish. Contains Benzoin, Balsam of Tolu and Alcohol. This is used for pulse tracings.

Collutorium Acidi Benzoici, R.D.H.

Dose.—One teaspoonful in a wineglassful of water.

Benzoic Acid 10 grains, Krameria Tincture 15 minims, Saccharin 6 grains, Peppermint Oil 2 minims, Cinnamon Oil 2 minims, Alcohol 90% to 1 ounce.

Miller's Mouth Wash is similar.

Trochisci Acidi Benzoici.

Contain ½ grain with either simple sugar or fruit basis (*Off.*); those of T.H have a red currant basis. Useful as a voice lozenge.

Ammonii Benzoas (*Off.*). $C_6H_5.COONH_4=139{\cdot}115$.

Dose.—5 to 15 grains (**0·3 to 1 Gm.**)

In colourless laminar crystals; ***soluble*** 1 in 6 of cold water, 1 in 30 of alcohol, and 1 in 8 of glycerin.

Flavoring.—Glyl Sassafras, Glyl Aurantii Amari; Syrupus Aurantii, Syrupus Tolutanus.

Useful expectorant in chronic bronchitis.

Where pyelitis is associated with cystitis the urine is frequently alkaline, ammoniacal and offensive, and these conditions may be increased by the use of alkalies, while remedies which tend to favour the acidity of the urine such as Ammonium Benzoate or Salicylic Acid, may be preferable on account of their action within the bladder. Boric Acid is also useful.—Tirard, Med. Treatment.

Mistura Boro-Benzoatis, K.C.H.

Dose.—1 ounce (**30 Cc.**).

Ammonium Benzoate 20 grains, Boric Acid 10 grains, Tincture of Hyoscyamus 30 minims, Infusion of Buchu to 1 ounce.

A useful urinary antiseptic mixture.

Traumatic paraplegia as a result of wounds in the war. Bladder and rectal functions show a departure from normal. Often there is complete paralysis of micturition. Ammonium Benzoate over long periods does not cause digestive upsets like Sodium Acid Phosphate. A routine mixture:—Ammonium Benzoate 15 grains, Urotropine 10 grains, Hyoscyamus Tincture 30 minims, Syrup of Orange 1 drachm, water to 1 ounce. The urine can generally be kept at a constant level of acidity by this and drainage. Irrigation with 1 in 8,000 Potassium Permanganate, in some cases.—O. H. Gotch, B.M.J. i./23,849.

Magnesii Benzoas $(C_6H_5.COO)_2Mg=266{\cdot}47$.

Dose.—5 to 15 grains (**0·3 to 1 Gm.**).

White crystalline powder. Antipyretic. ***Soluble*** in water 1 in 30, hardly soluble in alcohol 90%. ***Incompatible*** with Acids, also with Sodium Bicarbonate. Used as an anti-arthritic for rheumatism and cathartic in cirrhosis of the liver.

Sodii Benzoas (*Off.*); Fr. Cx. Sup. 1920. $C_6H_5.COONa=144{\cdot}075$.

Dose.—5 to 30 grains (**0·3 to 2 Gm.**).

In white granular crystals; ***soluble*** 1 in 2 of cold water.

Two varieties are made, one from the acid obtained from Gum Benzoin, the other from the artificial acid—the cheaper of the two.

Flavoring.—Syl Vanillæ, Glyl Carui, Syrupus Aromaticus, Elixir Simplex.

Incompatible with mineral acids and with Ferric Chloride. It is apt to cause gastric irritation if taken on an empty stomach, owing to flow of gastric juice.

Uses.—*vide* Benzoic Acid. Acute lacunar tonsillitis is stated to be curable by Sodium Benzoate in 12 to 36 hours if given in 5 to 15 grain doses every 2 hours.

—In pyelitis due to *B. Coli* infection, Sodium Benzoate combined with Hexamine has given good results.

Tablets 2 grains each.

Effervescent Sodium Benzoate.

Dose.—1 drachm. Contains 6 grains in 1 drachm.

Benzoyl Peroxide, $C_6H_5—CO.O_2.CO.C_6H_5=242{\cdot}15$. A crystalline compound, M. Pt. 103·5°, prepared by the interaction of 100 of sodium peroxide and 180 of benzoyl chloride, at a low temperature. Soluble slightly in water, more so in alcohol.—F.N. 1908,34.

Uses.—For burns and ulcers 2 to 3% solution in oil.

***Cryogenin** (T.M. 248320).—*Syn.* Meta-benzamine-semicarbazide. $C_6H_4.CONH_2.NH.NH.CONH_2=194{\cdot}1$.

Dose.—3 to 24 grains (**0·2 to 1·5 Gm.**).

A crystalline body ***soluble*** 1 in 100 of water and 1 in 25 of alcohol 90%.

A useful antipyretic in all acute fevers. A case of erysipelas migrans successfully treated. Dose 10 to 15 grains per diem during 7 days, also in treatment of phthisis and lingering pyrexia following acute stages of an infection.—H. Sainsbury, L. ii./15,336. A. T. Davies adds his testimony in chest affections. Begins with 5 to 7 grain doses at 3 p.m. to anticipate the evening rise in temperature. If single dose not sufficient give 5 grains thrice daily in the 12 hours—*ibid.* 835.

Acidum Hippuricum. *Syn.* Benzamido-acetic Acid, Benzoyl glycocoll. $COOH.CH_2.NH.CO.C_6H_5=179{\cdot}125$.

Dose.—5 to 20 grains (**0·3 to 1·2 Gm.**).

This acid, occurring as white crystals, ***soluble*** in hot water (very slightly in cold—about 1 in 600), melting at 187° C., may be prepared from the urine of herbivora, also synthetically by treating glycocoll (Amido-acetic Acid, $CH_2NH_2.COOH$, *q.v.*) with Benzoyl Chloride or Benzoic Anhydride.

Manufacture.—Add dry powdered Glycine to excess of Benzoic Anhydride heated in an oil bath until the mixture gradually becomes red. Dissolve the melt in water, neutralise with alkali, acidify and put aside for several days to completely throw out the acid. Filter off the precipitate and decolorise in boiling water with charcoal. Concentrate on water bath until crystallisation begins in

the warm liquor. Gradually cool off and remove the Benzoic Acid formed simultaneously from the large crystals of Hippuric Acid by washing with Petroleum Ether (Ligroin). M.Pt. 187° C.

Hippuric Acid Synthesis Test as regards functional condition of the kidney. The normal amount of Hippuric Acid having been estimated, the patient is given 0·5 Gm. of Glycocoll and 50 Gm. of Hippuric Acid. Analysis of 24 hours' urine should then show an excess over normal of about 0·74 Gm., the normal being 0·4 Gm. When the figure is lower the hippuric function is abnormal and probably there is some renal parenchymatous disorder.—P. L. Violle, L.i./ 21,1239.

Sodii Hippuras. $C_9H_8NaNO_3$=201·117.

Dose.—5 to 30 grains (**0·3 to 2 Gm.**).

A soluble white powder used in gout, gravel, and calculus, as solvent for urates. A powerful depressant in arteriosclerosis.

Prepared by Corfield and Melhuish in a similar manner to the Lithium Salt (*q.v.*), except that it was found necessary to extract the dried mass with 97% Alcohol. This crystallised with 1½ molecules of water.

Ammonium Hippurate and **Calcium Hippurate** are salts with allied properties to the Sodium compound.

Acidum Anisicum (para-methoxy-benzoic acid) $C_6H_4OCH_3COOH$ =152·104, has no action of any kind whilst the ortho-analogue has no perceptible action in acute rheumatism.—R. Stockman.

Acidum Phthalicum. $C_6H_4.(COOH)_2$=166·088.

Dose.—20 grains 4 hourly. Has very slight anti-rheumatic effect.

ACIDUM BORICUM (*Off.*).

Syn. Boracic Acid, Hydrogen Borate. H_3BO_3=61·924.

Dose.—5 to 15 grains (**0·3 to 1 Gm.**).

In white laminar crystals, or as powder (that known as **Pulv. Acid. Boric. Subtilis** has been passed through a No. 170 sieve); with bitterish taste, made by the action of sulphuric acid on borax (and other borates).

Soluble 1 in about 25 of water, 1 in 3 of boiling water, 1 in 30 of 90% alcohol, 1 in 5 of glycerin at 0° C., 7 in 10 at 100° C., slightly soluble in volatile oils. Insoluble in ether.

May be made into pills with glycerin of tragacanth, or with one fifth of its weight of cream of tartar and water.

Incompatible with sodium salicylate in powder—a boro-salicylate is apparently formed.

Uses.—Antiseptic and antiputrefactive. In powder and crystals as dressing to wounds, sores, and skin generally. Boric Gauze contains 20%, Boric Lint and Boric Wool 50%. When mixed with starch it forms a useful "dusting powder" for infants, &c. A little in the socks or stockings prevents the odour of perspiring feet.

As **Eupad** and **Eusol** it was much used as a wound dressing.

Vomiting in gastric dilatation or gastric catarrh of infants has been treated by washing out the stomach with weak Boric Acid Lotion.

Cachets of Boric Acid contain 10 grains (**0·6 Gm.**), as antiseptic before and after bladder operations, have been given in typhoid, also for cystitis. **Tablets** contain 5 grains.

Fifty per cent. of the acid administered, it has been found, is excreted in the urine within 12 hours, the other half remains in the body for 3 or 4 days and hence may accumulate under repeated dosage.

B. Coli grew with difficulty in sterilised urine after taking Boric Acid *per os*. It is efficient as a urinary antiseptic, its action being apparently unaffected by alkalinity. It is said to be the best antiseptic when the urine cannot be made acid by giving Sodium Acid Phosphate (Hexamethylenetetramine acts only in acid urine). It is rapidly excreted.—A. Jordan, B.M.J. ii./13,653.

In otorrhœa an alcoholic solution of boric acid is better than the powder.

Rodent ulcer. A Boric Lotion and Adrenalin Solution applied had remarkable effect. In three weeks the ulcer healed.

Boric Acid Poisoning. A teaspoonful taken in error has caused death. Used for lavage, by idiosyncrasy it may prove poisonous.—Rash produced. Empty the stomach or give an emetic of mustard or Magnesium Sulphate. Its local use is sometimes stated to cause eczema.

For its use as a **milk cream, etc., preservative**—*vide Vol. II.*

Glycerinum Acidi Borici (*Off.*), **Glyceritum Boroglycerini.**

Heat Glycerin 9 (by weight) to not above 150° C., and add Boric Acid 6. Continue heat with stirring until weight is reduced to 10, and add Glycerin (by weight) 10. It is the equivalent of **Boroglyceride**, which was a patented preparation. **U.S.** has 31 in 100.

It is readily miscible with water and alcohol. It is used, 1 in 40 of water, as a food preservative. Of value in otorrhœa.

Pessus Boroglyceridi for vaginal use weigh 90 grains each, and contain 70 grains of Boroglyceride with gelatin and water, *q.s.*

Acidum Boro-Salicylicum.

Boric Acid 3, Salicylic Acid 1. A white powder, ***soluble*** about 1 in 120 of water. Is mostly employed as—

Sodium Boro-Salicylate.

Dose.—5 to 45 grains (**0·3 to 3·0 Gm.**)

Has been given in rheumatic affections.

Liquor Antisepticus, U.S. VIII.

Average dose.—1 drachm (**4 Cc.**); Boric Acid 20, Benzoic Acid 1, Thymol 1, Eucalyptol 0·25, Oil of Peppermint 0·5, Oil of Gaultheria 0·25, Oil of Thyme 0·1, Alcohol 250 and Water to 1,000. Filtered through talc. Resembles ✱ **Listerine**. (T.M. 27665 Class 3, 259141 and 294469 Class 48.)

Lotio Acidi Borici, R.O.H. 4%.

A most useful soothing antiseptic lotion for the eyes, bladder, vagina and mouth.

Isotonic Boric Acid Lotion is 2% strength—isotonic with the tears.

Lotio Acidi Borici cum Zinci Sulphate, R.O.H.—

Boric Acid 2, Zinc Sulphate 0·125, Water to 100.

A.B.C. Powder.

Boric Acid, Bismuth Subnitrate, Calomel, equal parts. A stimulant antiseptic dusting powder.

Pastillus Acidi Borici, T.H., *v.* **Glyco-gelatin Pastils.**

Useful in aphthous affections of the mouth and throat.

Pessus Acidi Borici.

Ten grains (**0.6 Gm.**) in each, with oil of theobroma.

Convenient to replace douches after delivery.

✱ **'Solubes' Boric Acid,** 15 grains each. For dissolving in 2 ounces of water as an eye-wash, or more for vaginal injection, or lotion to wounds.

'Solubes' Boro-Saline contain—

Sodium Biborate 5 grains, Sodium Chloride 5 grains.

'Solubes' Borax Compound contain—

Sodium Biborate 5, Sodium Chloride 2½, Phenol ½, Sodium Bicarbonate 2½ grains.

℞ [P1] **'Solubes' Borax and Cocaine Compound** contain—

Sodium Biborate 2 grains, Boric Acid 1 grain, Benzoic Acid ¼ grain, Menthol $\frac{1}{100}$ grain, Thymol $\frac{1}{100}$ grain, Cocaine Hydrochloride $\frac{1}{10}$ grain with Sodium Chloride *q.s.* to 10 grains.

Dissolved in 2 or 3 ounces of warm water and used as a nasal or throat spray

Suppositorium Acidi Borici.

Three grains (**0·2 Gm.**) in each. Useful in pruritus.

Unguentum Acidi Borici—*Martindale.*

	No. 1.	No. 2.	No. 3.
Paraffin (M.Pt. 57° C.)	5	5	5
Vaseline	5	10	15
Boric Acid, in fine powder.. ..	2	3	4

Melt the paraffin and vaseline together; sift the Boric Acid into the liquid, and stir constantly till cold. These three ointments contain the same quantity of Boric Acid, *i.e.*, 1 to 5 of basis; they are also made **half** and **quarter strength** *i.e.*, 1 of the acid to 11 and 1 to 23 of basis respectively. The ointment of full strength is used where cavities exist; the others are softer and used to superficial wounds.

Boric Acid Ointment (No. 2) is for general use to surface wounds, burns, eczema, chaps, pruritus ani et pudendi, and sores, as an antiseptic dressing and 'healing ointment.'

The 'No. 3' is suitable for toilet use. **'Boric Cream'** is similar.

'Collapsubes,' *i.e.*, collapsible tubes containing ointments, creams and lubricants, with catheter attachment for applying to the urethra, and with suitable tubes for the uterus and rectum. For general purposes 'Collapsubes' alone are provided. *See* Index for list.

'Collapsubes' are also suitable for introducing ointments into the nose. The patient should put the head well back and press the ointment into the nostrils.

Small size Collapsubes marked* in Index are convenient in ophthalmic surgery.

Drugs in a semi-solid cream in collapsible tubes for war use, *e.g.*, a cream containing 30 minims of Chlorodyne per inch of the exuding cream or Morphine 2 grains per inch, etc.—F. W. Tunnicliffe, L.i/15, 274.

Unguentum Acidi Pheno-Borici.

Contains 2½% of Phenol added to either No. 1, No. 2, or No. 3 Boric Acid Ointment. In some cases this may prove more healing.

Unguentum Lano-Boricum Camphoratum.

Boric Acid Ointment (No. 2) ½ ounce, Hydrous Lanolin ½ ounce, Essential Oil of Camphor 20 minims.

For earache in children. Applied with a brush to the meatus.

Vaselinum Acidi Borici.—*Syn.* BORIC VASELINE.

Boric Acid in fine powder 1, White Vaseline 9.

In Collapsubes with catheter attachment for urethral use or with tube suitable for uterine or rectal use.

Unguentum Demulcens R.N.H.

Boric Acid 5 grains, Glycerin of Starch, Hydrous Wool Fat, and Soft Paraffin of each equal parts, to 1 ounce.

Magnesii Boro-Citras.

Dose.—15 to 30 grains (**1 to 2 Gm.**).

In white powder or colourless scales. ***Manufacture.***—Dissolve Light Magnesium Carbonate 70 in a solution of Citric Acid 100 in Water 400, add Boric Acid 30, evaporate to dryness on a water bath and powder or scale. ***Soluble*** in water; used as a urinary antiseptic internally for stone, gout, and rheumatism; and 1 with 2 of sugar is prescribed as **Boracite,** or **Pulvis Magnesii-Boro-Citratis Composita.** *Dose.*—60 grains *ter die,* to sterilise the urine 48 hours before operations.

Undergoes some dissociation in the body, with hæmostatic effect, but inferior to the lactate *q.v.*

Sodii Biboras. Borax. **Sodii Boras** (U.S.) *Syn.* Sodium Pyroborate, Sodium Tetraborate. $Na_2B_4O_7.10H_2O=381.76$.

Dose.—5 to 20 grains (**0·3 to 1·2 Gm.**).

Soluble 1 in 25 water, in glycerin 1 in 1, insoluble in alcohol (90%). ***Incompatible*** with gums, mineral acids, also with cocaine hydrochloride.

Flavoring.—Glyl Pini, Syl Lavandulæ, Syl Rosæ; Syrupus Aromaticus.

Uses.—As gargle in diphtheria, for aphthæ, cancrum oris, and gangrenous stomatitis; pruritus ani and vulvæ, in bromidrosis and fœtid sweating of the feet.

Gouty affections are treated with compresses of saturated solution.

In very chronic epilepsy as an adjuvant to or substitute for bromide.—J. Taylor, L. i./09,908. Rashes may result.

In epilepsy it lessens excitability. Subsequently a mixture of Potassium Bromide and Borax used; benefit marked. Number of fits reduced.—J. McCartney, B.M.J. ii./20,548. Large reduction in number of fits and improvement in mental condition. "Periodical violent explosive outbursts" disappeared.—J. McCartney, B.M.J. ii./21,527. See also *ibid.*, 617,673. A further report; Borax and Bromide combined with Fowler's Solution. Results satisfactory.—B.M.J. i./23,16. *See also Potassium Borotartrate.*

Sodii Boro-Tartras. *Syn.* Tartarus Boraxatus. Ph. Ned.

Dose.—20 to 40 grains (**1·2 to 2·5 Gm.**).

Sodium Biborate 2, Potassium Acid Tartrate 5, Water 15, evaporate until a little of the residue cooled is brittle. Powder and dry at 50° C. Antiseptic and diuretic. May be tried for gout.

Sodii Perboras. Fr. Cx. Supp. II. $NaBO_3,4H_2O=153·964$; derived from the hypothetical Perboric Acid, $HBO_3=59·908$. A white permanent powder. ***Soluble*** in water, about 1 in 20, with decomposition.

Manufacture.—Sodium Perborate may be prepared pure by treating Crystalline Borax 380 Gm. with Normal Sodium Hydrate Solution 2,000 Cc. to convert it into Sodium Metaborate—$NaBO_2$, and then adding to the solution 4,500 Cc. of 10 Volume Hydrogen Peroxide Solution. Cool immediately by refrigeration and collect and dry the crystalline precipitate on filter paper.

Uses.—Antiseptic and deodorising.

Is stated to contain "10% active oxygen." This can be calculated as follows :—

2 $NaBO_3,4H_2O = Na_2B_2O_4 + O_2 + 4H_2O$, *i.e.*, 307·928 Sodium Perborate should produce 32 available Oxygen = 10% approx allowing for impurity.

Assay (FR. CX. Supp. II.).—Dissolve 0·25 Gm. of the salt in 50 Cc. of distilled water and 10 Cc. of dilute Sulphuric Acid. Add to this solution sufficient solution of Potassium Permanganate (3·16 : 1000) to produce a permanent rose colour. For this purpose at least 28 Cc. should be required, corresponding to 9% of active oxygen, or 86·5% for the pure salt.

To produce **Oxygenated Water,** 1 kilo yields 104 Gm. or about 72 litres of active oxygen. This quantity will produce 7 to 7·5 litres of '10 volume' oxygenated water. The solution is not acid. It contains Hydrogen Peroxide and Borax.

In practice (*a*) 25 Gm. of the salt dissolved in a litre of water at 35° C is said to give a '5 volume' strength Hydrogen Peroxide Solution ; (*b*) 170 Gm. with 60 Gm. Citric Acid makes a litre of '10 volume' strength.

Some experiments were instituted to confirm these figures. Sodium Perborate of commerce was found to be 87% pure. It was found that (*a*) above gave experimentally, only 1·6 times its volume approximately, NOT 5 times as stated. This, indeed, approximates theory as to above (which is virtually correct).

(*b*). Experimentally, 11 volumes of oxygen were produced.

These solutions may be used to prepare antiseptic lotions, vaginal injections (about '5 volume' strength), *e.g.*, in leucorrhœa and metritis, and are useful in minor surgery. The dry salt may be used as a disinfectant, deodorant dusting powder.

It has been used for soil-contaminated wounds.

Tonsillitis occurring as complication in typhoid has been treated with Sodium Perborate gargle, 2 drachms to the pint.

Unguentum Sodii Perboratis. 1% in Paraffin Ointment basis. Antiseptic and healing.

Sodium Perborate Tooth Powder. Sodium Perborate 2%, in Precipitated Calcium Carbonate.

*Perborol (T.M. 280256) is a trade name for Sodium Perborate.

Sodium Perborate Mouth Tablets.—Patented method of manufacture No. 1578 of 1912. Tablets containing Sodium Perborate and an acid containing water of crystallisation, *e.g.*, Citric Acid, have the disadvantage of spontaneously decomposing, liberating Hydrogen Peroxide. This patent involves the use of mixtures of Perborate with a dry acid or an acid salt wherein the Perborate is partly or wholly dehydrated, a Carbonate being added. Sodium Bicarbonate may be added to form a stable product. On adding to water an alkaline solution of H_2O_2 is produced.—P.J ii./12,232.

***Zoel** (T.M. 373442) **Antiseptic** contains Sodium Monoborate (Metaborate, $NaBO_2$). Antiseptic and deodorant. A white granular substance soluble in water 1 in 18. It is alkaline in reaction and on this account permits a free flow of lymph without coagulating.—L. ii./16,832.

***Zymocide** (T.M. 244131).

A liquid antiseptic. Diluted 1 to 5 or 10 of water, is used as a vaginal douche, also as a tooth wash, etc. Said to contain Extracts of Golden Seal and Calendula, Zinc Sulphocarbolate, Boric Acid, Witch Hazel, Sodium Thymolate, Menthol, and the Oils of Wintergreen and Eucalyptus.

ACIDUM CARBOLICUM (*Off.*).

Ⓟ*Carbolic Acid and liquid preparations of Carbolic Acid and its homologues, containing more than 3% of these substances, except preparations for use as sheep wash or for any other purpose in connection with agriculture or horticulture, contained in a closed vessel distinctly labelled with the word 'Poisonous,' the name and address of the seller and a notice of the special purpose for which the preparations are intended.*

For further details and an Order in Council regarding the sale by retail by registered and unregistered persons of liquid preparations sold as Carbolic, Carbolic Acid, Carbolic Substitutes or Carbolic Disinfectant *containing not more than 3% of Phenols, see 'Orders in Council.'*

Ⓟ**Phenol** (*Off.*) *Syn.*—PHENYL HYDRATE, $C_6H_5OH.=94{\cdot}078$

Dose.—1 to 3 grains (**0·06 to 0·2 Gm.**)

FR. CX.; Max. single dose, 1½ grains; max. during 24 hours 4½ grains approximately.

In colourless crystals liable to become pink—a little Sulphurous Acid will prevent this for a long time. Neutral to test paper; made by distillation of coal tar. M. Pt. 39·40° C. (FR. CX. Supp. 1920, 41° C.).

In commerce it is also available as "**Ice Crystals,**" *i.e.*, in crystalline agglomerated masses, sometimes termed "**No. 1. Acid.**"

Antidotes.—Give Sodium Sulphate or Magnesium Sulphate 1 or 2 ounces in ½ pint of water. (They do not act chemically but hinder absorption.) Wash out the stomach with water by a tube several times with great care. Apomorphine as emetic, but it does not always 'act'. White of egg, and large doses of any innocuous oil should be given. Calcium saccharate and Caffeine are also antidotes. The former may be freely administered. Amyl Nitrite Sterules, hot water bottles. Camphorated Oil (2 drachms) has been used with recovery.

Iodine is a true antidote. Use within obvious limits the same quantity of Tincture of Iodine as of Liquid Carbolic Acid.

Alcohol lavage is no good; it promotes absorption. The same applies to plain water and glycerin.

Poisonous Effects.

Compresses soaked with 5% solution of Phenol may cause coma.—L. i./95, 1362. Even 1 in 40 has caused carboluria and death when applied to penis after circumcision.—W. W. W. *cf.* L. i./09,564—but this is exceptional. Danger when used as dressings to extremities—fingers and toes.—L. i./03,1099. B.M.J. ./07,1110. P.J. ii./11,780.

Ochronosis associated with carboluria caused by local application of Carbolic Oil 1 in 20.—Q. Jl. Med., July, 1910.

Inhalation of fumes of Carbolic Acid, owing to dropping of a Winchester and the boy starting to mop it up with a cloth, caused grave poisoning symptoms. Intravenous Saline 2 pints with addition of 2 drachms of Sodium Bicarbonate saved life. Breathing (assisted by the use of Oxygen) improved at once.—R. Eccles Smith, L. ii./22,1359.

Absorption of crude Carbolic Acid through the skin with fatal result. A bottle broke in a man's pocket on his journey home by train—extensive burning of hip, thigh and scrotum. Ultimate death.—W. R. M. Turtle and T. Dolan, L. ii./22,1273.

Solubility.—100 parts are liquefied by 10 of water, should form a clear liquid with 30 to 40 of water, and should be completely dissolved by 1,200 of water. Also soluble 3½ in 1 glycerin, 3 in 1 chloroform (nearly), 1 in 2 olive oil, 5 in 1 ether, 6 in 1 alcohol (90%), 2¼ in 1 benzol (nearly), and 1 in about 20 vaseline.

Solubility in Liquid Paraffin. 1% is a saturated solution. More will dissolve warm but throws out again on cooling. Much depends on the specific gravity and viscosity of the Paraffin. It has been thought that the addition of a small quantity of Menthol might form a non-escharotic compound and hence alleviate effect of the Phenol but this is erroneous. A case turned on the subject a few years ago in which a large proportion of Phenol (plus Menthol) had been prescribed as ear drops.

Flavoring.—Glyl Coriandri, Syl Vanillæ ; Tinctura Lavandulæ Composita, Tinctura Cinnamomi.

Uses.—A powerful antiseptic, anti-putrefactive, caustic, and applied locally, anæsthetic. Internally for dyspepsia and flatulence, *e.g.* with rhubarb and nux vomica extract in pill. Also for tetanus and erysipelas, in typhoid fever and diarrhœa in pills coated to render them soluble in the intestines, and in puerperal fever, phthisis, bronchitis, pertussis, and for the gangrenous stage of pneumonia.

As a vaginal injection one in 80 or more of water for leucorrhœa, uterine ulceration, erysipelas, and cancer ; cleanses, heals, disinfects and allays pain, and is suitable as a gargle.

Mosquitos are kept away by 1% solution. It also relieves bites of same. 2% is effective for disinfecting instruments, the skin, and for artificial dentures left in soak all night.

In acute coryza a 1 % spray is useful.

A 10% solution, with cocaine added, relieves non-suppurative middle ear diseases.

Small-pox pustules have been touched with liquid acid with good results.

Tetanus has been treated by Phenol injections, but there is no evidence of any effect on the course of the disease—*see* Tetanus.

Laryngeal tuberculosis. Amputation of the diseased portion of the epiglottis, and under cocaine, pure carbolic acid was applied (four times at intervals of a fortnight) to the ulcerated area, no sign of infiltration or ulceration in the larynx.—P. R. S. M. Laryng. Section, 1911,43.

Sapræmia treated by swabbing out the uterus with a mixture of equal parts Carbolic Acid and Camphor.—L. ii./09,339.

Appendical abscess treated by swabbing out cavity with pure Liquefied Phenol (after removing appendix if reasonably possible) Subsequently spreading Iodoform (any amount up to ½ teaspoonful) in same, after drying out. A rubber drainage tube ¼ inch in diameter is placed at the lower end of the cavity and an Iodoform gauze strip is packed into same sufficient to fill the cavity : this with the tube is conducted out of the abdomen about the centre of the wound. Subsequently they are removed.—B.M.J. i./11,676.

War wounds. When used pure cauterizes the surface and is only feebly antiseptic as its combination with albumin drains back all discharges. Solutions 1 in 60 on double cyanide gauze good "in a rush." Painless, but a weak destroyer of putrefactive organisms. Gauze must not be wrung out with the bare hand—Casualty Station experience.—A. Don, B.M.J. i./16,648.

Hæmorrhoids treated by interstitial injection of solution of Carbolic Acid in Liquid Extract of Hamamelis.—*See Hamamelis.*

Ⓟ**Phenol Tablets,** ¼ and ½ grain for internal administration.

Ⓟ**Phenol Solubes,** 5 and 20 grains, on dissolving, produce antiseptic lotions.

Potassium Carbolate, in proportion of 1 molecule added to 3 of Phenol assists solubility of Tablets of this kind.

Ⓟ**Acidum Carbolicum Liquefactum** (*Off.*).

Dose.—1 to 3 minims (**0·06 to 0·2 Cc.**).

Fifteen parts of water by weight added to 100 of above, *i.e.*, 87% nearly. Sp. Gr. 1·067 to 1·069. This is used as a caustic.

Trouble frequently arises with liquefied phenol crystallising in the winter, when there is a sudden drop in the temperature. Experiments which we conducted showed that the proportions 8-1, 9-1, 10-1, are all apt to separate.

Suggestion to make this by adding 20 Gm. of water to 100 Gm. of Phenol, *i.e.* 83·3% by weight. This has Sp. Gr. 1·064 and a melting point after freezing of 6·5° C. (43·7° F.) It would therefore remain liquid in fairly cold weather.—C. T. Bennett, P.J.i./21,472.

Ⓟ**Carbolic Acid, Camphorated.**

Phenol 12, Camphor 4, Water 1.

Melt or rub together till liquefied. Is not miscible with water or glycerin. Antiseptic, and local anæsthetic, serviceable in toothache.

Ulcers produced by 'X' ray burns have been treated locally by a mixture of equal parts of Carbolic Acid Crystals and Camphor.

Caution.—*Neither of these is intended for extensive general use. They are not suited for applying all over the face! Accidents have occurred.*

Acne.—In bad cases press out the comedones, puncture pustules, evacuate contents, and apply to each the smallest quantity of a mixture of carbolic acid crystals and camphor in equal parts or in proportion of 3 to 2. Subsequent usual sulphur applications.—Phineas Abraham, B.M.J. ii./12,289.

War wounds of all kinds, many of them 'large,' treated by application of equal parts Phenol and Camphor—highly spoken of.—I. Feldman and A. J. Walton, L. ii./16,1043.

'Phenolisation' of gas gangrene wounds with Phenol 9 and Alcohol 1, was employed in the war, with Mencière's Solution after.

Hypopyon ulcers treated by a mixture of Phenol and Camphor applied with a match.—Bishop Harman, B.M.J. ii./21,737.

Ⓟ***Carbolic Acid Lotion.** *Syn.* PHENOL LOTION.

Liquefied Phenol 1, Water 19 or more as required.

Lotio Acidi Carbolici, R.O.H.

Phenol 1 in Water 20, 40, 60 or 100 at 50° C.

Solutio Phenolis, F.I., or Aqua Phenolata, to contain 2% of Phenol. Aqua Carbolisata P. Jap. is this strength.

℞ Ⓟ**Lotio Acidi Carbolici et Cocainæ.**

Carbolic Acid ½ drachm, Cocaine Hydrochloride ½ drachm, Cherry Laurel Water 1 ounce, Rose Water 3 ounces. For pruritus.

In the later stage of treatment of chronic eczema a Lotion containing Phenol, Liquor Picis Carbonis, Glycerin and Spirit may be used as a stimulant to growth of healthier epidermis.

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* But see par., page 16.

Ⓟ Carbolic Oil.
Phenol 1, Olive Oil 19 (more or less, if ordered). For burns and scalds.

Scarlet Fever.—Children suffering with, disinfected by rubbing with 10% Carbolic Oil or Eucalyptus Oil. Tonsils also painted with 10% Carbolic Oil during the first 24 hours. B.M.J. ii./18,359.

We would suggest caution in such procedure. *See also Therapeutic Index.*

Ⓟ Lund's Oil, L.L. *Syn.* Oleum Lubricans. CATHETER OIL. For oiling catheters, Phenol 1, Castor Oil 4, Almond Oil 20.

Surgical Lubricant for catheters, &c.
Starch 4, Glycerin 35, add Water 8½ ; heat to boiling, remove from flame and add Boric Acid in powder 2½, warm to dissolve, and when nearly cold add Phenol 1. The Lubricant is non-greasy and has the advantage over oily compounds of not attacking rubber goods. It can be removed by water. It will not attack metal instruments if left in contact for a short time, but is not intended as a coating to store them in—for this, vaseline or liquid paraffin is best.

[P1] **Catheter Lubricant. Meltzer's Formula. Am. Ph. A.**
Triturate Tragacanth 3 with Water 100, add Glycerin 20 and sterilise, then add Mercury Oxycyanide 0·25.

Gargarisma Acidi Carbolici.
Aqueous Solution 1 in 100 or more. For foul breath and sore throat. E.L. 1 of Glycerol of Carbolic Acid in 40.

Gauze, Carbolic, 5%, is in 6-yard pieces. **Carbolic Gauze Bandages (Lister's)** are also made.

Gossypium Carbolisatum. *Syn*, **Carbolic Wool.**
To prepare this, impregnate Absorbent Cotton 1, under pressure with 1 of an ethereal solution (5%) of Phenol. Spread out and dry rapidly. **Linteum Acidi Carbolici** is also 5%.

For methods of preparing **Catgut and other Ligatures,** *see Vol. II.*

Ⓟ Glycerinum Acidi Carbolici (*Off*). *Syn.* **Glyceritum Phenolis,** Phenol 1, Glycerin *q.s.* to 5. (U.S. Liquefied Phenol).

Dose.—(not *Off.*) 5 to 15 minims (**0·3 to 1 Cc.**).

The preparation seems to be unnecessarily strong for general local use. It is employed as a throat pigment and is applied to wounds and to ringworm. It has been used in acute middle ear catarrh with good result.

For earache a few drops of Solution of Phenol ,6 grains to the ounce of Glycerin (**Guttæ Acidi Carbolici**) slightly warmed, are invaluable.

A solution of Phenol in Glycerin is almost non-caustic and only slightly toxic. See Iontophoresis, Vol. II.

For the itching of eczema, Carbolic Acid 4 grains, Glycerin 40 minims, Alcohol 90% to 1 ounce is often useful, but may irritate.

Carbuncles well treated by applying pledgets soaked in the glycerol. As soon as pus shows, the epithelium is turned back and the part may be later syringed out. No fear of absorption of the Acid owing to hygroscopic action of the Glycerin.—B.M.J. i./09,1481.

Ⓟ**Ravogli's Liniment.** Carbolic Acid 1, Glycerin 2, Alcohol 90% 16, Rose Water to 32. In skin affections.

Ⓟ**Pigmentum Antisepticum.**

For hay fever. Glycerin of Carbolic Acid 1 ounce, Quinine Hydrochloride 30 grains, forms a useful pigment for the nasal passages.

Solution of Phenol 2% in Spirit is used for diphtheritic membrane.

Ⓟ**Iodized Phenol.** **Pigmentum Iodi Carbolicum, Acidum Carbolicum Liquefactum et Iodum —C. H. W.**

Iodine 1, Liquefied Phenol 4. Digest till dissolved. For intra-uterine medication on cotton wool.

Chronic discharging sinuses treated by 5 minutes' application of iodized Phenol.—B.M.J. ii./11,1594.

Inoperable uterine carcinoma has been treated after curetting, by application of iodized phenol.

Useful also for ring worm of the scalp. *Carefully distinguish from*:—**Dilute Iodized Phenol Injection.**

As pigment in diphtheria, or as a gargle or inhalation a much weaker preparation is made containing Solution of Iodine (Lugol's) 2·5, Phenol 1, Boiling Water to 200. Is useful also as a nasal douche in ozœna, and for intra-uterine injection.

Physicians should carefully specify which is required.

Tuberculous sinuses of ankle joint treated by injecting a solution of strength 320 grains of Iodine in 8 ounces of Liquefied Phenol—afterwards binding the walls together tightly. Important to protect healthy skin. Healed in two weeks.—B.M.J. ii./09,828.

Injectio Acidi Carbolici Hypodermica.

Dose.—5 to 20 minims (**0·3 to 1·2 Cc.**)

Two per cent. strength. This has been used for tetanus, erysipelas, and phlegmonous inflammations of the skin.—Whitla.

Ⓟ**Liquor Sodii Carbolatis.**

Dissolve Phenol 8, Caustic Soda 3½, in Distilled Water 100.

To be diluted with 10 to 20 times its volume of water.

These proportions of Phenol and Sodium Hydroxide are nearly the quantities required by theory, and they will be found to yield a sharp and pleasant mouth-wash.

Ⓟ**Phenol Sodique** used by dentists is similar.

Fr. Cx. has Carbolic Acid 100 Gm., Sodium Hydroxide Solution 20 Gm. (30% by weight). Water to 1,000 Cc.

The Sodium Hydroxide obviously is insufficient to combine with the Phenol. The Fr. Cx. preparation, in fact, contains about 8·6 Gm. per 100 Cc. *free* Phenol, only 1·4 of the total 10 Gm. being in the combined condition, whilst the Fr. Cx. 1884 had the correct proportions to make Sodium Phenate.—W. H. M.

Antiseptic Dental ✱ 'Solubes.'

For preparing an extemporaneous antiseptic mouth-wash.

Contain Boric Acid, Sodium Phenate, Thymol, Sodium Benzoate, and Aromatic Essential Oils. Employed in the prevention of dental caries and in suppurating conditions. One to be used in a wineglassful of water (preferably warm).

Pastillus Acidi Carbolici. (Glyco-Gelatin Basis.)
Contains ½ grain (0·03 Gm.) phenol. Antiseptic and stimulant. For ulcers in the mouth or throat, and for purifying the breath.

Perles and Capsules of Carbolic Acid.
Globules of gelatin containing in oil, one grain (0·06 Gm.) and two grains (0·12 Gm.) of Phenol in each. *Dose.*—1 or 2.

Pilula Acidi Carbolici.
Phenol 2, Powdered Liquorice 1, Powdered Althæa 1. In grains for one pill, in grammes for 15 pills.

Smelling Salts, Carbolised.
Phenol 24, Ammonium Carbonate 16, Strong Solution of Ammonia 44, Oil of Lavender 1½, Camphor 3, Pine Sawdust (sifted), *q.s.* For coryza, hay fever, influenza, &c.

Anti-Catarrhal Salts.
Phenol 1, Eucalyptus Oil 1, Pumilio Pine Oil ½, Strong Iodine Solution ½, Camphor 1, Ammoniated Alcohol 2, Pine Sawdust 2 or *q.s.*

℗**Resina Acidi Carbolici, R.D.H.**
Resin 4, Carbolic Acid 4, Chloroform 3. Dissolve and filter.
This is used as an obtundent and a temporary antiseptic filling. Method.—Syringe out all food from the cavity and remove as much decay as possible. Apply on a wool pledget to relieve toothache.

Suppositorium Acidi Carbolici (*Off.*).
Phenol 0·8 Gm., White Beeswax 0·5 Gm., Oil of Theobroma, *q.s.* for 12.

Trochisci Acidi Carbolici (*Off.*).
One grain (0·06 Gm.) with Sugar basis, lemon flavored. For sores in mouth and throat.

Unguentum Acidi Carbolici (*Off.*).
Phenol 3% in White Paraffin Ointment. For ulcers and parasitic skin diseases.
An ointment made with Almond Oil or Adeps Lanæ instead of the Glycerin in the '98 B.P. formula is satisfactory.

℞ℙ**Unguentum Acidi Carbolici cum Cocaina.**
Liquefied Carbolic Acid 20 minims, Cocaine Hydrochloride 10 grains, Vaseline 1 ounce.

℗**Unguentum Acidi Carbolici cum Hydrargyri Perchlorido.**
Liquefied Carbolic Acid ½ drachm, Mercuric Chloride 2 grains, Olive Oil 2 drachms, Zinc Ointment to 1 ounce.
Both the above are used for pruritus.

Unguentum Acidi Carbolici cum Menthol.
Carbolic Acid 2, Menthol 1, Cold Cream 100.
For eczema with much itching.—H.

Vapor Acidi Carbolici.
20 drops of Liquefied Phenol in a pint of water at 60° C. Inhaled or as a spray, in pertussis and for throat ulcers It lessens and disinfects the expectoration in bronchitis and gangrenous lung.

℗**Preservative Solution** for Anatomical Specimens, *e.g.*, for injection into the aorta.
Phenol 1, Glycerin 4, Methylated Spirit 5.

Acidum Sulphocarbolicum. $C_6H_4.OH.SO_3H=174{\cdot}138$.

Syn. PHENOL-SULPHONIC or SOZOLIC ACID.

Prepared by the action of strong sulphuric acid on phenol. The *para*-acid is produced in the warm (the *ortho*- when working in the cold), crystallises with difficulty, dissolves readily in water, alcohol, and glycerin, and is a strong antiseptic and disinfectant.

In gingivitis and pyorrhœa a 3% **solution** is useful, reduces swelling, arrests flow of pus, and the gums return to their natural shape.

A 33% **solution** has been sold as **Aseptol.** Principally *para*-acid with only about 6% *ortho*-. To separate *ortho*- and *para*- acids utilise different solubilities of Mono-barium Salts—(SO_3H Salts)—that of the *ortho*- body crystallises out first. Similarly the *ortho*-magnesium compound is more soluble than *para*-.

See also Water Analysis, Vol. II.

Cupri Sulphocarbolas.—*Syn.* CUPRI ASEPTOL.

$(C_6H_4\ OH.SO_3)_2\ Cu\ +\ 6H_2O=517{\cdot}846$.

In light green crystals, soluble in water, a useful hæmostatic or antiseptic lotion, or astringent injection, $\frac{1}{4}$ to $1\frac{1}{2}$%.

Choleraic diseases have been treated with 1/24 grain per hour—all serious symptoms aborted in a few hours. A little Paregoric and Cinnamon may be added. This seems to have beneficial action directly—especially to an inflamed colon.

Sodii Sulphocarbolas B.P. '98, SODIUM PHENOL PARASULPHONATE $C_6H_4OH.SO_2ONa,2H_2O=232{\cdot}122$.

Dose.—5 to 15 grains (**0·3 to 1 Gm.**).

In white rhombic crystals, somewhat like magnesium sulphate.

Soluble 1 in 5 of water, in alcohol 90% 1 in 130, by experiment.—W.H.M., Nov. 1915.

Flavoring.—Diluted, it has little taste.

Uses.—In dilatation of the stomach due to flatulence and fermentation. For flatulence, the dyspepsia of phthisis, and in tonsillitis 5 to 10 grains every 2 hours have been given.

In malignant endocarditis has been used in 30 grain doses, accompanied by inunctions of Carbolic Oil (1 in 5), but it is probably of little value.

Zinci Sulphocarbolas. B.P. '98. ZINC PHENOL-PARA-SULPHONATE; ZINCI PHENOLSULPHONAS, $(C_6H_4OH.SO_3)_2Zn,H_2O=429{\cdot}646$. The commercial salt contains $8H_2O$ (U.S.), making the molecular weight 555·758.

Crystals in rectangular colourless plates. ***Soluble*** 1 in 2 of water. In Alcohol 90% 1 in 3, by experiment.—W.H.M., Nov. 1915.

In gonorrhœa and leucorrhœa; 2 or 3 grains per ounce for injection '**Solubes,**' 2 and 10 grains (**0·12 and 0·6 Gm.**), produce 2 and 10 ounces or more respectively of lotions for external use or injection.

Tribromophenol.—*Syn.* BROMOL. $C_6H_2Br_3.OH = 330{\cdot}814$.

Dose.—$\frac{1}{2}$ to 2 grains (**0·03 to 0·12 Gm.**) in pill.

Manufacture.—By adding Bromine 120, in small portions, to Phenol 53, dissolved in water, *q.s.*, with continuous stirring and recrystallising the product from spirit.

In long silky needles, nearly insoluble in water, soluble 1 in 3 of alcohol 90%, 1 in 1 of ether, 1 in 3 of chloroform and glycerin; also soluble in fats and oils. M.Pt. 85° C. Used alone is strongly antiseptic; ointment (10%), oily solution (1 in 30). Is not dissolved by gastric juice, and is used as an intestinal disinfectant and in typhoid, also in minute doses for cholera infantum.

Tribromophenol-Bismuth.—*Syn.* **Bromphenobis.** *Xeroform. (T.M. 216423/1899.)

$(C_6H_2Br_3O)_2.Bi.OH + Bi_2O_3(?) = 1348{\cdot}62$. P. Ital. IV.: (also P. Jap. IV. but without formula), P. Helv. has $Bi_2C_6H_3Br_3O_4$.

Dose.—5 to 20 grains (**0·3 to 1·2 Gm.**).

Manufacture.—**The British Patents 13291 of 1892 and 15361 of 1894 have lapsed.**

The details of procedure generally given are misleading. A yellow preparation containing about 50% of Bismuth Oxide can be made from Bismuth Subnitrate by the following method.

A boiling solution of Bismuth Subnitrate 12, concentrated Nitric Acid 20 by volume, and water 80 is rapidly added, with stirring, to a hot solution of Tribromphenol 13, in Caustic Soda 12 and water 200. If the resulting liquid is not slightly alkaline it must be quickly made so by adding Caustic Soda solution, since heating in presence of Nitric Acid gives a product of red colour. The mixed solutions are heated on the water bath for several minutes, when the yellow Bismuth Tribromphenol settles out. It is filtered off hot, washed with warm water, and finally with a small quantity of spirit, and dried.

The substance prepared in this way—like the product when Bismuth Citrate is used (as mentioned in our last edition)—appears to contain some free Tribromphenol, but it has only a slight odour and taste, and is yellow.

Many experiments were carried out in an attempt to prepare a Bismuth Tribromphenate of definite composition and quite free from Tribromphenol, but these were all unsuccessful; washing with unlimited quantities of alcohol always altered the colour of the substance, finally giving a substance with a very high content of Bismuth.—From experiments conducted in the author's laboratories, 1923.

TESTS.—(Pharmacopœia Helvetica). Citron yellow or orange yellow powder, almost tasteless and odourless. The alkaline solution filtered and acidified with hydrochoric acid gives a floculent precipitate which on recrystallising from dilute alcohol melts at about 91° C.

If 0·5 Gm. Bismuth Tribromphenol be shaken with 5 Cc. Alcohol, 1 Cc. of the filtrate on diluting with 15 Cc. of water gives neither opalescence nor a precipitate of Tribromphenol.

THEORETICAL.

The formula for this compound has always been open to discussion. We have selected $(C_6H_2Br_3O)_2$ BiOH. Bi_2O_3 to work with, as yielding the nearest to 50% Bi_2O_3. It yields 51% nearly.

$Bi_2O_3OH(O.C_6H_2Br_3)$ yields 58·4% approximately.

In the preparation the reaction is represented thus:—$2\ (C_6H_2Br_3ONa) + 7\ NaOH + 3\ Bi(NO_3)_3 = (C_6H_2Br_3O)_2\ BiOH.\ Bi_2O_3 + 9\ NaNO_3 + 3\ H_2O$.

Characters.—A yellowish insoluble powder, with faint odour and taste, containing bismuth oxide and tribromophenol in nearly equal proportions. An intestinal antiseptic, *e.g.* for cholera.

Gauze, Bromphenobis, 10%, 6-yard pieces.

Phenosalyl.

The Ⓟ following is similar.—Phenol 90, Salicylic Acid 20, Lactic Acid and Menthol of each 1, mix by heat. 0·2—0·4% in conjunctivitis and in eczema 1%.

Trichlorphenol.—*Syn.* TRICHLORPHENIC ACID. $C_6H_2Cl_3.OH$.

White crystals, with pungent taste; soluble 1 in 1 alcohol, 2 in 1 ether, 1 in 9 glycerin, fixed and volatile oils. Ointment or solution 10%.

Para-Monochlorphenol. $C_6H_4Cl.OH = 128·53$.

Manufacture.—By passing Chlorine into Phenol 3, kept cool with ice until the product weighs approx. 4. Fractionate the product, reserving the portion distilling at the correct B.pt.

Crystalline needles, ***soluble*** in alcohol and ether, but not in water to any extent. M. Pt. 37° C., B. Pt. 217° C. **Liquid** para-Monochlor-phenol is practically identical and is used similarly. The *ortho-* body boils at 176° C. and the *meta-* melts at 28·5° C. and boils at 212° C.

A powerful antiseptic used in treatment of lupus, phthisis, keratitis, iritis, and is also employed in dental work as an analgesic. A paste for subsequent filling is made with powdered Cobalt and Tropacocaine Hydrochloride of each equal parts, with sufficient Para Monochlorphenol and Zinc Oxide to produce a soft paste. The unpleasant taste may be moderated by Menthol.

5 to 10% in glycerin has also been used for laryngeal catarrh. Inhalations ½ to ¼%.

Unguentum para-Monochlorphenol.

Para-Monochlorphenol 1, 2 or 5, Vaseline 50, Hydrous Wool Fat 50. Chilblains are well treated with this and solution *cf.* Therapeutic Index. To cover the odor we found Lavender Oil 5% useful.

✱ **Soloform.** (T.M. 368583), 'SOLUTIO TRI-IODO PHENIC ALCOHOL,' R.V.I.

A preparation of **Tri-iodophenol** $C_6H_2I_3OH$, used for making lotions and gargles.

✱ **Dimol.** (T.M. 408144). *Syn.* **Dimethyl-methoxyphenol,** $C_6H_2(CH_3)_2(OCH_3).OH. = 152·141$.

Dose.—In Tablets (Pulverettes) containing 1 grain—2 to 4 with water after each meal; also in *Syrup* strength 0·3 grain per drachm. A powerful bactericide for intestinal affections.

Stated to have a C.A. Coefficient (Rideal-Walker method) of 35. It has been well spoken of in dysentery, colitis and intestinal toxæmias generally. It is described as Dimethyl-methoxyphenol $C_6H_2(CH_3)_2(OCH_3).OH$ in combination with tri- and tetramethoxyphenols. The phenyl radical is not split off in its passage through the intestine—the preparation is voided in the fæces unchanged.

Chronic intestinal stasis well treated by Dimol as an antiseptic.—Sir W. Arbuthnot Lane, Pr., May, 22/305.

Summer diarrhœa in infants treated by **Dimol Syrup**; 1 drachm doses for babies 9 to 15 months, and ½ drachm for babies 3 to 9 months, every 4 hours.—A. N. M. Davidson, L. ii./22,1112.

E. W. Ainley Walker writes that he has no connection with Dimol or other antiseptic of commerce.—L. i./22,404.

Duodenal lavage conducted with the following: Sodium Sulphate 360 grains, Dimol Powder 165 grains, water 40 ounces.—J. T. A. Walker, Pres., Feb. 23,70.

ACIDUM CARBONICUM.

Carbon Dioxide, Carbonic Anhydride. CO_2=44·005.

Carbon Dioxide in the **gaseous condition** in small percentages has been advocated for use therapeutically, *i.e.*, when used in dilutions of 4 to 6% with air it stimulates expiration, acts as a cardiac stimulant, exerts an indirect effect as a sedative and possesses the property of toning up a weak pulse.

It has also been inhaled in ozæna and nasal catarrh. It is believed to act as an antiseptic in such cases.

After anæsthetic and operation Carbon Dioxide inhalation properly diluted with air beneficial and with care a safe treatment. Augments breathing which ventilates the anæsthetic out of the blood. Has stimulant effect on circulation.—Jl.A.M.A., Mar. 20/20, p. 783, per Pres., Feb. 21, 41.

Perirenal inflation with 500 Cc. of CO_2 or oxygen (Carelli Method) —former in preference as it is rapidly absorbed. The procedure is of utility for taking X-ray photos. The kidney lies like an island in a lake of air.—F. Hernaman-Johnson, B.M.J. i./22,91.

'Carbonic Snow' *i.e.*, Carbon Dioxide in the semi-solid condition, formed as the gas evaporates from a storage cylinder, is much employed therapeutically.

The procedure is known as **Refrigeration** or **Chrymotherapy** (κρυμός=frost). The gas cylinders containing some 20-30 pounds (7 lb. cylinders are also filled and may prove more convenient) at a pressure of about 950 lbs. to the square inch (65 atmospheres), yield the snow on opening with a temperature —79° C. (—110° F.), which by collecting in a suitable receptacle can be formed into a stick or crayon like an ordinary candle, or may be compressed into a mould and cut any shape with a knife. The cylinders should be mounted on a stand with the stopcock on a lower level than the opposite end so that the liquid gas covers the inner orifice of the valve.

Crayons, Method of Making.—The snow evaporates slowly—a crayon 5 by 1 inch will last about 1 to 2 hours. As many as thirty applications with this size can be made. The temperature of the crayon is *constant*. A towel is folded into three and wrapped round an ordinary ruler—the ruler is then removed and the tube thus produced is bound on to the valve of the CO_2 Cylinder, the gas is turned on and the towel tube fills with the snow. The frozen gas may then be pressed into a piece of Vulcanite or Celluloid Tubing about 1 inch in diameter with a ruler. A cardboard postal tube or roll of blotting paper (several thicknesses) will also serve. Cover end of crayon with lint for handling. Can be pointed with a pen-knife or shaped by rubbing against the side of a vessel, *e.g.*, copper steriliser—containing hot water.

Moulds may also be made of the shape of an umbrella ferrule with rods to fit.

An old glove finger has been suggested for collecting the CO_2 by tying on to the vent of the cylinder. When completely filled and rigid, remove and with a sharp knife cut the end of the finger off at

about 1½ inches from the point, thus exposing a corresponding length of the crayon, which can be used to the part, the rest of the glove finger serving as a holder.

Hall-Edwards' Collector and Applicator.—The collector consists of a tube formed from a sheet of perforated zinc or tin, inside which is a tube of copper-wire gauze: between the two is a layer of felt. The complete tube is furnished at the upper end with a brass mount slightly tapered internally, and is about 8 inches long and 1¼ inch in diameter. At the lower end there is another brass mount, over which—by a bayonet-catch—a vulcanite end can be attached, this constituting the mould for compressing the snow. The open end of this mould is stoppered by a vulcanite plug during collection. By a tapered brass plug the gas bottle is attached to the upper end of the collector, and the turning of the key releases the gas. When there is sufficient snow in the collector, a vulcanite rod fitting the lower end is passed down the centre, and the snow falling into the mould is compressed. The bottom vulcanite plug is now removed and the vulcanite rod pushed through the hole, thus releasing the tablet. By regulating the pressure, tablets can be made of varying thicknesses. The applicator is made of vulcanite except the piston, which carries the plunger, the collar which guides it, and the spring which keeps it in position. The lower end of the tube is bevelled to form a thin edge, and the plunger is held up by a spring at about ¼ inch from the end of the tube. The plunger is perforated to allow of escape of gas and can be brought to a level with the end of the tube by pressure on knob. The ease of application is a feature of the instrument, the applicator being held like a hypodermic syringe, and pressure being applied by the thumb.—C D. i./10,387, *v. also* L. ii./11,87.

Uses.—For removal of nævi, moles and blemishes, lupus erythematosus, lupus vulgaris, rodent ulcer, and warts (for last mentioned long application necessary). Also employed for trachoma and chronic localised eczema. A single application usually suffices.

In the case of an ordinary capillary nævus the crayon is roughly shaped to that of the nævus—or slightly larger; it is applied and firmly pressed down for, on an average, 40 seconds. If there is bone immediately beneath, a shorter time will do. For a cavernous nævus the end of the crayon is made the same size or slightly smaller than the area of the growth. A long application with deep pressure should effectually freeze the whole mass.

In keratosis accompanying 'X' ray dermatitis, brief applications answer well. The hard white frozen surface, on removing the crayon, shows a depression according to the amount of pressure employed—the depression gradually returns to its normal shape. The treated area then becomes firmer and in two or three minutes swollen. A wheal forms with acute hyperæmia within half an hour and a vesicle usually within an hour, applying thirty seconds or longer, this will almost certainly be followed by scarring. An intense superficial destruction is obtained by a second application immediately after the tissues have thawed out.

Boric Acid Ointment is used for after-treatment. If blister forms the fluid is removed within a few days, the crust forming should be allowed to fall off. The scar ultimately is pale, soft and pliable.

The thawing out is more painful than the freezing. Chronic localised eczema has been treated and the method may be applied energetically in trachoma without risk. The lid is everted and separated from the globe by a non-conducting spatula,—the pencil is lightly pressed down on to the part of the conjunctiva to be treated

for 15 to 30 seconds,—the longer time being reached by gradual increase with each weekly sitting.

In treating corneal ulcers the surface of the ulcer is carefully touched with the pencils. It is not necessary to instil cocaine. If patient complains of discomfort the eye can be bathed with cold boracic lotion. Immediately afterwards the whole surface of the ulcer becomes white and raised, within twenty-four or thirty six hours this "slough" separates, leaving a clean healing ulcer. Infiltrations disappear from the surrounding healthy cornea and hypopyon vanishes. The resulting opacity is less than in the case of ulcers of similar type and severity treated on other lines. After the application of the snow, pads and bandages are used instead of fomentations, and atropine sulphate 1% is instilled once daily. The method is not advised for marginal or ring ulcers.—Pres. June, 1911.

General psoriasis,—patches on each wrist removed by 30 seconds application—perfect cure in three weeks.—B.M.J. i./11,416.

For large port wine stains and moles where many applications would have to be made LIQUID AIR (*q.v.*) is said to be more satisfactory.

In hæmorrhoids Carbon Dioxide satisfactory.—B.M.J. i./12,120.

Oriental sore has been treated. Perseverance is necessary as there is strong tendency to recur. A solution of the Snow in Ether applied with a cotton wool tampon has been used in America, but this does not produce any greater intensity of cold nor reduce time of exposure.—J. L. Bunch, B.M.J. ii./13,1006.

A mixture of Acetone and Carbon Dioxide Snow painted on with camel hair brush may be used to freeze superficial tissue and destroy syphilis virus in case of chance infection, *e.g.* of the fingers.—W. Knowsley Sibley, Pres. Apl./21,159.

Electrical Properties of Solid Carbon Dioxide.

C. E. S. Philips showed that when the nozzle of a steel cylinder is suddenly opened and the snow allowed to escape, an electrostatic voltmeter connected to the tube indicated a potential of 6,000 volts. The sign of the electricity is always negative—independent of the substance of the nozzle. The solid is rapidly changing to gas. The momentary surface of this snow is therefore very easily removed by contact or friction. The fact that of two bodies rubbed together the one which loses its surface more easily becomes negatively electrified relatively to the other, seems to explain the invariable negative charge on the snow, irrespective of the material of the orifice from which it is forcibly ejected. Thus a stick of compressed CO_2 snow may be negatively electrified by lightly rubbing it with any other suitable material.—J.R.S., July, 1912.

For details of the presence of excess of CO_2 in the air and its effect on the human organism on inhalation, see Oxygen.

ACIDA CHLORACETICA.

Acidum Monochloraceticum. $CH_2Cl.COOH=94{\cdot}494$.

Preparation.—By Chlorination of Acetic Acid in presence of Iodine at water-bath temperature, reserving the 180°—188° C. fraction.

Deliquescent white crystals, M. Pt. 63° C., or liquefied. It blisters the skin, and is a caustic for warts and corns. ***Soluble*** with ease in water, alcohol, and ether.

In the electrolysis of Sodium Chloride, as used in treatment of gonorrhœa, this acid is less decomposed than the salt, and it is able to neutralise the alkalinity which would deposit against the urethral membrane. *cf.* Gonorrhœa, Therapeutic Index.

Acidum Dichloraceticum. $CHCl_2.COOH=128{\cdot}946$.

A colourless caustic for venereal sores.

Acidum Trichloraceticum. **U.S., P. Helv., Ph. Ned., P. Jap.,** $CCl_3.COOH=163{\cdot}398$.

Prepared by chlorination of acetic acid, or by the action of fuming nitric acid on chloral hydrate.

In deliquescent crystals, M. Pt. 55° C. (lower if moist), and boiling at 195° C., very soluble in water, alcohol and ether.

Uses.—A quick escharotic for venereal and other warts. The application of a crystal produces a dry adhering eschar which is quickly thrown off. There is said to be no secondary inflammation. For use as an astringent lotion or gargle, 1 to 5% aqueous solution may be used, and as strong as 1 in 1 or 2 of glycerin with a little iodine and potassium iodide has been employed for temporary application. In ear work it is employed for the closing of perforations—a few applications once a week.

In chronic gonorrhœa, solution 1 in 4, is applied on a tampon by means of an endoscope; less painful than silver nitrate. Also, diluted, for epistaxis. Tobacco stains on the teeth can be removed by its cautious use (25% solution).

Tonsils, Diseases of. Where operative treatment is not permitted, the use of Trichloracetic Acid applied on a right angled wool-carrier and passed deeply into the crypts, has been found of value in reducing the size of the tonsil and adding to the comfort of the patient.

In Rigg's disease—incipient stages—this acid applied to the gum after cleaning with Hydrogen Peroxide Solution 10 or 20 Volume, is a good remedy—even curative. The action is probably dual—killing the infective organisms and dissolving the Calcium Carbonate of the tartar. With the disappearance of the tartar the presence of bacteria is excluded. Should be tried before sound teeth are sacrificed.

Vincent's Angina. Trichloracetic Acid stated to be specific.—T. J. Gallaher Pres., Aug. 1920. Chromic Acid applications (saturated solution) also advised. Afterwards gargle with water, later with Hydrogen Peroxide diluted 1 : 10. Further bibliography *ibid.* Feb., 1921,63.

For its use as a delicate test for albumin, *v. Vol. II.*

ACIDUM CINNAMICUM.

Cinnamylic Acid.—*Syn.* **Phenylacrylic Acid.**

$C_6H_5CH : CH.CO.OH=148{\cdot}109$.

Dose.—*Per os*, $\frac{1}{20}$ to $\frac{1}{4}$ grain (**0·003 to 0·016 Gm.**).

Intravenously (in oily emulsion) $\frac{1}{50}$ to $\frac{1}{20}$ grain (**0·0013 to 0·003 Gm.**).

May be manufactured by the oxidation of Cinnamon Oil or by acting upon Benzaldehyde with Acetyl Chloride. In transparent micaceous crystals, melting at about 130° C., very slightly soluble in water, soluble in alcohol, ether and oils.

Preparation of synthetic and artificial acid. Tests and reactions.—P.J. i./10,727.

Uses.—Cinnamic Acid has been thought to induce leucocytosis. J. G. Ross used Cinnamon Oil in treatment of influenza.—L. ii./06, 1240; i. /22,252. It is mostly used as the Sodium Salt.

Sodii Cinnamas.—*Syn.* HETOL.

$C_6H_5CH : CH.CO.ONa = 170{\cdot}101.$

Dose.—3 to 5 grains (**0·2 to 0·3 Gm.**), *per os*, or hypodermically as Glycerin Solution *v. infra.*

Soluble 1 in 11 water, in glycerin 1 in 10 (*secundum artem*).

Pulmonary tuberculosis has been well treated by intravenous injection of 0·1 Gm. in 10 Cc. normal saline over prolonged periods (Landerer).

The cinnamates have vasodilatory action (Oliver), and in this direction are harmless even on prolonged use.

Cystitis and influenza have been beneficially treated with it.

Leukæmia treated by Sodium Cinnamate. Two cases improved by Sodium Cinnamate intravenously starting with only 1 mgr.—the highest dose being 20 to 25 mgr.—B.M.J.E. ii./22,93.

Glycerinum Sodii Cinnamatis.

Dose.—30 to 60 minims (**2 to 4 Cc.**) by injection.

This 10 per cent. solution in sterilised glycerin is made by heating to not exceeding 180° C. (356° F.) and is employed for hypodermic and intravenous injection in tuberculosis and cancer, the theory being that it causes a general leucocytosis.

The late L. Drage obtained good results from the use of the Glycerin solution, and recovery in two cases of basal meningitis almost certainly tubercular. Children tolerate doses of 10–15 minims daily,—given subcutaneously in the back of the neck. This authority also employed the injection in numerous other infective cases —*cf.*

Injectio Sodii ortho-Coumaratis *postea.*

The papers communicated by the late Dr. Lovell Drage to the *Lancet*, *British Medical Journal* and the *Second International Congress of Surgery* at Brussels have been carefully collected in book form, with a preface by Sir Squire Sprigge. In this preface it is stated that Lovell Drage had the true spirit of the investigating physician, and that he showed this spirit alike towards the problems of medical life and towards the solution of scientific questions. Drage felt keenly that it was a reproach to medicine that the mortality from cancer should be so high, and should show signs of rising, at a time when advances in diagnosis and treatment were being recorded. His earnest hope was that his recommendations for the medical treatment of cancer should receive attention from his colleagues and he hoped that further investigation by others with larger opportunities, especially for co-operative work, would have a fruitful result.

* **Sterules of Glycerole of Sodium Cinnamate** contain 30 minims (**2 Cc.**) each.

Strontii Cinnamas $(C_6H_5.CH:CH.CO.O)_2Sr=381{\cdot}832$.

Dose.—2 to 5 grains (**0·12 to 0·3 Gm.**).

A white powder, soluble about 1 in 120 of water and about 1 in 50 of a mixture of glycerin and water equal parts, and about 1 in 100 of alcohol 90%. This has been used similarly to the Sodium Salt.

Sodium Phenyl Propiolate.—*Syn.* THERMIOL, $C_6H_5C{\vdots}C.COONa=168{\cdot}085$ (+ Aq.)

Is supplied in commerce in 25% solution. Has been used in laryngeal and pulmonary tuberculosis by inhalation of 0·5 to 3% solutions. Note the treble linkage in the side chain indicating a physiologically more active body than the parent Cinnamic Acid.

Cinnaldehydum.—$C_6H_5CH:CH.COH=132{\cdot}109$. *Syn.* **Cinnamal, P. Austr.** *Dose.*—1 minim (**0·06 Cc.**).

The aldehyde from cinnamon oil. A colourless liquid with cinnamon odour. Sp. Gr. 1·054 to 1·056. ***Soluble*** in alcohol in all proportions.

Capsules (Gelatin) of Cinnamic Aldehyde, 1 minim, have been used in malignant disease. Drage reported on its value in tuberculosis, especially in pulmonary cases.

Acidum Coumaricum.—*Syn. o*-**Hydroxycinnamic Acid.**

$C_6H_4OH.CH:CH.COOH=164{\cdot}109$.

Manufactured by heating coumarin 10 parts with a solution of 3·5 parts of sodium in 65 parts of absolute alcohol. The solution is then diluted with water and evaporated to small bulk. The acid is liberated by means of dilute hydrochloric acid. It is removed and dissolved in sodium carbonate. The sodium salt in solution is then freed from coumarin by shaking with ether (coumarin remaining unattacked can thus be recovered and used up again). The acid is then thrown out again with a little dilute hydrochloric acid and is purified by recrystallisation from alcohol. Work is needed on the process. The yield is bad.

Ortho-coumaric acid forms brownish crystals, melting at 200° C. the meta- melts at 191° C., and the para- at 206° C.

It was thought that the sodium salt of this hydroxycinnamic acid would prove more powerful than the cinnamic salt which had already yielded good results in the treatment of malignant diseases (see Glycerinum Sodii Cinnamatis). This opinion was deduced by comparing the action of salicylic acid (hydroxybenzoic acid) with that of benzoic acid (introduction of the **Hydroxyl** grouping). Furthermore it may be noted that ortho-coumaric acid stands in the same relationship to salicylic acid as cinnamic does to benzoic acid—introduction of the **Acrylic** grouping.

Soluble very slightly in chloroform, in alcohol 1 in 12 or less, in ether 1 in 36, hardly soluble in water.

The Rideal-Walker coefficients to *B. typhosus* for the acids in 40% alcohol are : ortho- 6·5 ; meta- 4·5 ; para- 4·0.—J. T. A. Walker.

Uses.—For general treatment and as a precursor to and after operation (for three months if necessary) in malignant disease. The sodium salt is not so painful on injection as the cinnamate. It is stated to prevent proliferation of cells in cancer.

The coumarates have action of vasodilators, and they may be taken for prolonged periods without harm.—Oliver.

Sodii Ortho-Coumaras. $C_9H_7O_3Na=186{\cdot}101$. This salt is best used in the form of

Injectio Sodii Ortho-Coumaratis; a 22% aqueous solution.

Dose.—25 minims (**1·5 Cc.**).

Injected thrice weekly when possible between the malignant growth and healthy subjacent tissues or in the course of lymphatics proceeding from the region of the growth, or over a large serous sac like the peritoneum.

This injection is a clear yellow liquid perfectly stable.

In glandular and early cases of pulmonary tuberculosis Drage reported good results with the injection. In cancer, greater difficulty is experienced, owing to the variation of the disease; but Drage held th at very few drugs exert more definite action.

Cancer, inoperable in a man of 74, well treated by this salt and sodium cinnamate with 'X' ray irradiation. Papilloma on middle third of left vocal cord similarly, with result that pain disappeared, voice improved, which previously had been quite out of control.

Injections were made into the pleural cavity, in a case of malignancy either in the pleura or in the root of the lung, after removal of large volumes of fluid. There was some sign of efficacy, though transient. —A private communication (1913).

Sodium Ortho-Coumarate Sterules contain 25 minims of the above injection. They are also made with **Kerocain** $\frac{1}{5}$ grain; also with **Kerocain** $\frac{1}{5}$ grain and **Adrenalin Solution** 10 minims. Drage obtained good results with this injection.

'Fibrocoumarin' Sterules contain **Sodium Orthocoumarate** injection 25 minims, **Thiosinamin** 2 grains and **Kerocain** $\frac{1}{5}$ grain. This is especially suitable where tissue is cicatricised.

'Fibrocoumarin' Sterules with **Adrenalin Solution** 10 minims. Favourable results have been obtained by injection of this preparation into the growth. Drage stated it is the most active local agent he had used. *cf.* also **Cicatricine** for a simple solution of Thiosinamin.

***Tylmarin** (T. M. 283966). *Syn.* **Acidum Acetyl-*o*-Coumaricum.**



$=206{\cdot}135$.

Dose.—5 to 10 grains (**0·3 to 0·6 Gm.**) thrice daily after food.

Colourless crystals melting at 150° C.

This substance constitutes a stage further in the Cinnamic and Coumaric treatment. In view of advantages that acetyl-salicylic acid has over salicylic acid, ortho-coumaric acid has been acetylated.

Soluble only slightly in water (easily in presence of alkali, but dissociation occurs), in alcohol 90% 1 in 19, in ether 1 in 50, in chloroform 1 in 16.

Uses.—More essentially for malignant disease, but also for tuberculosis and as a general intestinal antiseptic.

Any early case of glandular or pulmonary tuberculosis which can be cured by open-air treatment can be successfully treated with this

drug accompanied by injections of Sodium Orthocoumarate—it is a valuable adjuvant (Drage).

The carbolic acid (Walker-Rideal) coefficient of Tylmarin in 40% alcohol with *B. typhosus* was found to be 4·5.—J.T. Ainslie Walker

Tylmarin Cachets and **Tablets** contain 5 grains (**0·3 Gm.**).

Tylmarin Dusting Powder has been used to cancerous growths which have broken down. Large open sores can be materially benefited.

Tylmarin Gauze in one yard pieces is prepared for packing for local use.

The diminution in size of lymphatic glands secondarily infected has been very marked, and fresh invasion is prevented.

No toxic effects have been experienced in the use of any of these methods. A patient with sarcoma in the palate, rendering him practically deaf, received 3 injections of Sodium Coumarate and 5 grains of Tylmarin twice daily. Condition immensely improved. Two cases of carcinoma of the œsophagus improved, also cases of carcinoma of the breast. Success is more likely with definite chemicals than with undefined ones.—Drage, L. ii./o8,1367.

Tylmarin Sodium, *Syn.* Sodii Aceto-Coumaras.

$C_6H_4O.CO.CH_3\ CH : CH.COONa = 228{\cdot}127.$

Dose.—5 grains (**0·3 Gm.**).

This substance would be decomposed in the stomach yielding Tylmarin in a nascent condition as initial product. Needle crystals very ***soluble*** in water (1 in less than 1) and in Alcohol (90%) 1 in 2. Might also be tried by hypodermic injection.

Tylmarin-Quinine. *Syn.* Quininæ Aceto-Coumaras.

$C_{20}H_{24}N_2O_2.\ C_6H_4O.COCH_3.CH : CH.COOH = 530{\cdot}443.$

Dose.—3 to 5 grains (**0·2 to 0·3 Gm.**).

White powder containing approximately 60% Quinine and 40% Tylmarin, ***soluble*** very slightly in water (less than 1 in 800) in Alcohol 90% 1 in 9, in Glycerin 1 in 30. Antiseptic and febrifuge.

Tylmarin-Thorium *Syn.* Thorii Aceto-Coumaras.

$Th(OH)_4[Th(C_6H_4\ O.CO.CH_3.CH{:}\ CH.COO)_4]_2 = 2405{\cdot}048$

A buff coloured powder containing approximately 35% of Thorium Oxide prepared by double decomposition between Thorium Nitrate and Sodium Aceto-Coumarate. For local use in malignant disease.

We conducted some **photographic experiments** to determine the radio-activity of this substance. It was found that Tylmarin Thorium and Thorium Oleate (*q.v.*) were about equal in activity, both being slightly stronger than the Nitrate.

The compound may prove of value by hypodermic injection. "**Sterules**" are prepared containing 10 minims of a 10% suspension in Sterilised Almond Oil. Suggested for use in malignant disease on the lines of the other Coumaric preparations.

Coumarin. *Syn.* Coumaric Anhydride, $C_9H_6O_2 = 146{\cdot}093$.

This crystalline body which has an aromatic odour and taste is contained in Tonquin beans from *Dipteryx odorata* (Willd.) and *D. oppositifolia* (Willd.). (*N.O. Leguminosæ*), also in Woodruff.

It is made synthetically by boiling Salicylic Aldehyde with Sodium Acetate and Acetic Anhydride or by heating Acetic Anhydride with Sodium Salicylic Aldehyde.

Soluble in alcohol, ether and oils, but not to any extent in water. Sublimes unchanged. One part will disguise the odour of 50 of iodoform.

ACIDUM CITRICUM. (*Off.*)

$C_3H_4OH.(COOH)_3$, H_2O=210·11.

Dose.—5 to 20 grains (**0·3 to 1·2 Gm.**).

Colourless crystals or white powder, 99·5% pure.—*Off.* and U.S. Lemon juice contains as much as 7 to 9%(30 to 40 grains per ounce).

Soluble.—2 in 1 of water, 1 in 2 of glycerin, 1 in 1½ of alcohol (90%), 1 in 8 of ether, Sp. Gr. 0·735, but much less soluble in 0·720 ether.

For quantities of alkalis to be prescribed with this acid in the form of effervescing mixtures, *vide* NEUTRALISATION TABLE.

Uses.—Relieves thirst in fever. Lemon juice is better than citric acid for scurvy. A useful method of preserving it is to boil the juice, place in stone bottles whilst hot, and cover with a little oil before plugging with a cork. Will keep for months.

In rheumatism and given internally in jaundice.—H.

Diminishes coagulability of the blood (Sir A. E. Wright). *Vide* also Calcium Chapter and *Vol. II.*

To replace Hydrochloric Acid, Citric Acid recommended where it is desired to administer acid to bring acidity of the urine to normal. The amount required would be roughly 7 Gm., in the case of a neutral gastric juice. It can be given in pill form.—B.M.J.E. ii./22,78.

Organic acids, *e.g.*, Citric, Acetic and Tartaric in form of salts suggested for all types of protozoal infections : malaria, Leishmania infections, trypanosomiasis, spirochætoses. These acids are thought to act as powerful katabolic poisons to malarial parasites. Kala-azar parasites experimentally flourish and multiply in citrated blood at 20° C. but die out rapidly at 40°C. Numerous cases of malaria treated without Quinine on these lines, also amœbic hepatitis, without Emetine.—S. L. Rodrigues, Bombay, May, 1922.

Incompatible with potassium tartrate and alkaline carbonates.

Impurity.—Lead should not exceed 20 parts per million (*Off.*).

Lotio Acidi Citrici et Phenolis. Citric Acid 3 drachms, Phenol ½ ounce, Water to 1 pint. As an antiseptic tartar solvent, *e.g.*, in removing septic teeth.—L. ii./09,1666.

℗*ACIDUM CRESYLICUM.

Cresol (*Off.*). *Syn.* **Cresolum Crudum,** CRESYL, PARACRESYLOL, CRESYL HYDRATE, METHYL PHENOL, METHYL HYDROXYBENZENE, "COMMERCIAL CARBOLIC ACID," &c., $C_6H_4.OH.CH_3$ = 108.099. KRESOLUM CRUDUM P. HUNG, is "ACIDUM CARBOLICUM FLAVUM 100%."

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* But see p. 16.

Dose.—1 to 3 minims (**0·06 to 0·2 Cc.**).

A yellowish brown liquid with tar-like odour.

A mixture of ortho-, meta-, and paracresols, forming the principal constituent in crude carbolic acids. **Ortho**-cresol (1 : 2) melts at 31° C. and boils at 188° C. **Meta-** (1 : 3) is a colourless liquid, boiling at 201° C. **Para-** (1 : 4) melts at 36° C. and boils at 198° C. Fr. Cx. requires, in the following proportions : Ortho, 35 ; Meta 40, Para 25.

Sp. Gr. 1·04 to 1·05. When distilled 90% should boil at 195 to 205° C.

P.G.V. requires at least 50% *m*-cresol $C_6H_4.OH\ (CH_3)$. (1 : 3) also that at least 92% must distil between 199 to 204° C.

Method of estimating by converting into Trinitro-*m*-cresol is given.

Cresolo Grezzo, Ph. Ital. IV. The bulk must distil between 180 and 204° C.

Separation of m-and p-Cresol —Process depends on the fact that only Calcium *m*-Cresoxide is decomposed when the Calcium Salts of *m*- and *p*-Cresol are treated by superheated steam at 105—110° C. *m*-Cresol alone distils over.—Terrisse and Dessoulavy (D.R.P. 267210), ex J C.S.A. i./14,38.

Soluble 1 in 50 water (B.P., 1914), we find mostly 1 in 70. Miscible with alcohol 90%, chloroform, ether, castor oil, and glycerin in all strengths. Also miscible with almond and olive oil in all proportions, but to make a clear solution we found about 1 in $2\frac{1}{2}$ necessary.

Uses. The mixed Cresols are less potent in action than Phenol and are used in many respects on analogous lines to the latter. Their odour is a disadvantage. "Cresol" as in the case of the proprietary Ⓟ ✱**Vapocresolene** (T.M. 249455), is valuable for vaporising into the air in the treatment of whooping cough. Cresol is largely employed in the manufacture of Liquor Cresol Saponatus (*Off.*) and other disinfectants as described later. A small proportion (0·5%), preferably of the freshly distilled Trikresol, *q.v.*, is much used as an antiseptic to add to vaccines.

In whooping cough Vapocresolene to be burnt at night and give Benzol 6 minims to the half-ounce for a child of six, with less doses for lesser ages, down to 1 drachm for a child of one year.—R. L. Ley, L. i./23,255.

Disinfectants.

The nomenclature used by manufacturers in describing their preparations includes the following :—

"*Tar Acids.*"—These are Oxygenated Hydrocarbons including Phenols, Cresols, and higher Hydroxy compounds.

"*Phenoloids.*"—A vague term. The bodies so called *simply consist of phenol and its higher homologues.*

"*Tar Oils.*"—The neutral bodies present, *i.e.*, insoluble in soda.

"*Coke Oven Oils.*"—Contain varying percentages of "Phenoloids" with "Tar Oils."

The following are representative Cresylic Disinfectants :—

Disinfectants containing less than 3% Phenol and homologues sold at grocery shops and stores are relatively useless. The public should be protected. More disinfectants are sold by grocers than by chemists.—H. Kenwood, L. i./21,1327.

Ⓟ*Liquor Cresolis Saponatus. (*Off.*).

Mix Cresol 50 by weight with Castor Oil 35 by weight. Heat to 80° C. Dissolve Potassium Hydrate 8 in Water 7, mix and heat until 1 vol. mixes clear with 10 of Water. Cool and add Water to 100 by volume.

Many formulæ on these lines have been published—some employing Linseed Oil, as in the original Lysol formula. Others proceed without heating, making the Potash Soap first by shaking, adding a proportion of Alcohol and finally the Cresol little by little. Others again, *e.g.* the *U.S. IX*, suggest the use of an equivalent smaller proportion of ***Soda*** instead of Potash. We have conducted many experiments on this matter and have no hesitation in saying *the B.P. method is hard to beat.*

To make a *clearly* soluble article it is important to use the best potash available and the best Cresol, otherwise, on diluting with the water, the preparation will not be clear. Soda and Castor Oil will produce a clearly soluble Liquor Cresolis if the Soda be of the best quality, but from our experiments we do not favour the suggestion to use soda for a preparation of this kind.

The *Off.* liquor is *clearly soluble* in water. A miscible preparation is preferred, though in the past a *milky emulsion* with water was favoured.

The disinfecting power of the higher phenols increases in proportion to their position in the homologous series, but their solubility *decreases* proportionately. Bodies, therefore, with the *hypothetical* diphenyl nucleus which have become so popular can only be used as *emulsions* made with vegetable or with Tar Oils, glue, etc. The use of Alcohol to dissolve reduces activity.—Hewlett.

The **Lysol Patent** specification, 1017/1890 (expired) gives the following (*cf.* also p. 38):

(i). Tar Oil 100 Gm., Linseed Oil 100 Gm. Caustic Potash Solution (1 in 2) 75 Gm., Alcohol 65 Gm. Boil with reflux condenser until saponified.

(ii). Tar Oil 40 Gm., Common Resin 10 Gm., Caustic Potash Solution 70 Gm., Alcohol 70 Gm.

N.S.D. p. 1466, says *re* Lysol, the 190-200° C. fraction from Tar Oil is dissolved in fat and saponified after in presence of Alcohol.

Post-influenzal cough cured by inhalation of Lysol—about 1 drachm to 4 ozs. of boiling water.—C. Higgens, L. i./15,1204.

Antidotes—Egg albumen, oil, butter. On no account give water.

Proprietary Disinfectants (arranged alphabetically).

Ⓟ*✱**Acrosyl** (T.M. 358720, Class 2).—A saponified Cresol preparation containing 50 to 55% Cresols.

"C" Disinfecting Fluid. A cheap coal tar preparation (the exact composition not made public); employed *un*diluted found to be a very active disinfecter. It was devised at the Pathological Laboratory at Cambridge. The Medical Department of the Navy found it excellent for disinfecting corpses of men and animals in the Dardanelles. It kills flies, by spraying them and acts as a deterrent.—L. i./17,354.

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* But see par., p. 16

Ⓟ*✱**Cofectant** (T.M. 349583) has the following composition: Phenols or Phenoloids 66·27, Resins with fatty Acids 24·66, Water 6·4, Potash 2·67% (Total neutral excipients 33·73%).—L. ii./09,1457.

According to the "*Lancet*" Commission it had the highest C.A. Co-efficient when examined by its method.

Cofectant Lozenges for bacillary and coccigenic infection of the respiratory organs are made.

Ⓟ*✱**Creolin** (T.M. 84764 and 87839, also 63869, 81450, 87838 Class 2) **Pearson** (20% Cresylic Acid). (*Creoline is T.M. 214446 Class 2).

Ⓟ***Creophen** (Ferris) is described as a Coal Tar product for use as a medical and surgical antiseptic, deodorant, and bactericide. It possesses hæmostatic power and is non-irritant. It forms a white emulsion with water.

✱**Cyllin** (T.M. 256051, 258990, 259683, 299502) **Medical.** *Dose.*—1 to 5 minims (**0·06 to 0·3 Cc.**):

Is stated to contain 60% of members of a series of oxidised hydrocarbon having a diphenyl nucleus in place of the single phenyl found in carbolic acid; it is neither caustic nor toxic, emulsifying with water, and is a deodorising bactericide. Its Rideal-Walker carbolic acid co-efficient for *B. typhosus* is 20.

According to the Manufacturers, Cyllin does not contain so much as 3% of Carbolic acid or its homologues.

For lotions 1 to 200; as a douche 1 to 400.

As ointment 5% with Adeps Lanæ for erysipelas, eczema, and scabies

✱**Lano-Cyllin** (T.M. 264589) is supplied.

Lotio Cyllin (Creolin)—St. Th. H., Cyllin 1, Glycerin 8, Water to 160 St. J. H., 1 in 320 without glycerin, 1 to 2 drachms in a pint of water.

Capsules—1 and 3 minims keratin-coated, have been used in summer diarrhœa, dysentery, colitis and sprue. 'Stomachic' are also supplied.

Cyllin Dusting Powder.—Substitute for iodoform. **Gauze**—10% 1, and 20 yards rolls. **Inhalant**—Antiseptic. For use in phthisis with an air inhaler. **Pastils**—contain $\frac{1}{10}$ minim in each **Plaster**—5%. **Rectones**—(Suppositories). **Soft Soap**—Contains 5%; **Surgical Soap**—10% **Liquid Soap** is also made.

Ⓟ**Fluid Cyllin Disinfectant,** *i.e.* less refined than Medical Cyllin is also made.

Unguentum (Creolin) Cyllin Compositum—St. J. H., Cyllin ½, Soft Soap 1, Ammoniated Mercury Ointment 4, Soft Paraffin 8.

Cyllin Syrup.—*Dose* for adults 10 to 60 minims, for infants 5 to 10 minims. In infantile diarrhœa encouraging.—L. ii./06,1078.

In chronic eczema 1 in 200 with Lotio Calaminæ Oleosa.—B.M.J. i./09,1341

The Rideal-Walker Co-efficient for Cyllin in respect of *Staphylococcus Pyogenes Aureus* is 9·37.

Ⓟ**Diffusol, Lysol-Martindale.** A soapy solution containing 50% specially purified ortho-, meta- and para-cresols soluble in either hot or cold water in all proportions. For general surgical use dilute to 1%. For instruments 2%. For utensils 5%.

The diffusible and penetrating properties of this preparation were referred to in the Hunterian Oration by Sir Watson Cheyne, at the Royal College of Surgeons. The presence of 50% of cresol can be confirmed by decomposing it with calcium chloride and caustic soda. On filtration the cresols are obtained in alkaline solution, from which they are readily separated by the addition of an acid.

The penetration diffusibility is determined by means of **Edmunds' Cell**—an ingenious apparatus employing a slab of Agar culture medium with the Test organism brushed on one side and the antiseptic to be tested on the other. The area of no growth corresponds with diffusibility and penetration of the antiseptic. Diffusol was found superior to foreign made Lysol.

* But see par., p 16

✱**Hycol.** (T.M. 305595, Class 2, also 414679, Class 3).—A general disinfectant stated to contain 28% "Phenoloids" emulsifying with water. Carbolic Co-efficient on *B. Typhosus*—by the Rideal-Walker method is stated to be 18-20. The preparation is said by the makers to be "non-poisonous."

Hycol Medical is also made. *Dose* internally: 1 to 3 minims in cholera. A tar product containing 38% "Phenoloids" (200° to 305°) C.A. Co-efficient on *B. Typhosus* is indicated as 24-26. It is stated to be non-poisonous. It is used in dilution 1 in 10,000, *e.g.*, in blepharitis to as strong as 1 in 5, *e.g.*, in favus and lupus. In diphtheria as spray 1 in 1,000, in gonorrhœa 1 in 1,000 to 1 in 200; to wounds 2 to 5%. In gynæcology 1 in 400.

✱**Izal*** (T.Ms. 171127, 300079, Class 2; 171812, Class 3) **(Medical)**

Dose.—15 to 60 minims in ½ to 1 ounce milk or water.

An emulsion containing 45% Izal Oil—a "Coke Oven Oil," used as a non-poisonous disinfectant and antiseptic, 1 in 200 of water. Is stated to contain Phenoloids. It is destructive to *B. coli* and other organisms, and has been used pure in ringworm. Internally in cholera. In an epidemic a stock emulsion with Tragacanth mucilage, made of strength 1 drachm = 15 minims, is useful.

Izal has the advantage of mixing with all kinds of water whether strongly saline or otherwise. This is particularly noticeable on mixing Izal with urine, with which it forms a complete emulsion. In the case of soapy disinfectants the oily cresyl portion may be thrown out—or indeed the soap itself.

Capsules of Izal (plain), 2 minims and Izal 2 minims **with Cod Liver Oil** 5 minims are supplied for use in phthisis.

Izal, with Bismuth Subnitrate and Chloromorphine Solution, is useful in dysentery

Izal Fluid containing the same amount of impure Izal Oil is also supplied.

Strength of 1 in 400 disinfected *Staphylococcus pyogenes aureus* in pus in 15 minutes—in a simple broth culture 1 in 600 will do the work in 5 minutes.

Ⓟ✱**Jeyes Fluid Disinfectant** (T.M. 66985, 84764, Class 3; 42495, 51937, 63869, 81826, 81977, 154330, 186844, 204987, 206486, 218513, Class 2) to be distinguished from Cyllin (medical). It contains cresols, with resin soap. Solutions (1 and 2%) as antiseptic lotion, and injection 1 in 400 is said to be of value in gonorrhœa, also in ozæna.

Ⓟ✱**Jeyes Soluble Fluid** (✱**Jeysol.** T.M. 385267, Class 2) differs from the Fluid Disinfectant in mixing clear with water. It contains 50% of refined Cresylic Acid. For instruments 1% dilution is efficient.

Cresol Soap Solution made with Jeyes Fluid 1½ ozs., Soft Soap 1½ lbs. Water 10 gallons, used for the body and clothes—allowed to dry on; effective against vermin.—S. Monckton Copeman, L. i./15,273.

Ⓟ†**Kelvolin**—40% Cresylic Acid.—L. i./04,369.

✱**Kerol** (T.M. 275140, Class 2).—Composition not stated, though it is described as containing no Carbolic or Cresylic Acids and as non-poisonous. It is claimed to be a non-irritant germicide; is said to have a Carbolic Acid Co-efficient from 18·0 to 20·0 on *B. Typhosus* (Rideal-Walker Method). R. T. Hewlett reports this preparation slightly less toxic than Lysol—*vide* Med. Times, June 27, 1908.

1 in 180 is germicidal to Tubercle Bacilli in three hours even when dried.—W. G. Savage. **Kerol Capsules** are used as intestinal antiseptics.

Ⓟ†✱**Klondol** (T.M. 364070, Class 3, and 364147, Class 2). Described as a safe disinfectant for internal use, and for douching in 1% solution. Forms a clear solution with water.

Ⓟ†**Kresapol** (Ferris) is a Cresylic Acid Disinfectant made with Potash Soap. It is miscible with water in all proportions. For all forms of antiseptic cleaning.

Ⓟ†✱**Lycryl** (T.M. 363298, Class 3, and 363297, Class 2). Antiseptic containing 50% Cresols.

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* Makers say not Ⓟ.
† But see par. p. 16.

Ⓟ*✱†**Lysol.**—A dark alkaline liquid containing about 50% Cresols (*cf.*, p. 35).

Miscible with water. Prepared by mixing Oil of Tar with Linseed Oil or with a fat and saponifying the mixture with Caustic Potash and Alcohol.—

Incompatible with acids.

Poisonings. Many cases are recorded, *e.g.*, the following :—

Apparently about ½ ounce taken. Recovery after vomiting and a dose of Magnesium Sulphate. The copious vomiting and 3 glasses of milk which had been taken were probably the saving clause. Lavage not conducted.—B.M.J i /13,19.

Antidotes—Egg Albumen, Oil, Butter—on no account give water except by lavage.

Ⓟ*✱**Microbene** (T.M. 299709, also 321586, Class 2). (Note.—Microbane is a Trade Mark, 321733, Class 3.) Contains 50% Cresylic Acid. Has substantially the same R.W. value as "Hamburg" Lysol.—R. T. Hewlett, C.D. Oct. 17, 14.

Ⓟ*Mycetol.—A water-soluble Disinfectant similar to Lysol containing 50% of Cresylic Acid. It has a Carbolic Acid coefficient of 2·2 ; it does not irritate the skin and does not corrode instruments.

Ⓟ*✱**Pacolol** (T.M. 328,009)—Described as resembling Liquor Cresol Saponatus. It forms a clear solution in Distilled Water. For surgical use dilute 1 tablespoonful to 2½ pints. Carbolic Co-efficient with *B. Typhosus* 3·18 and using *B. Coli Communis* 2·25.

Ⓟ*✱**Pathone** (T.M. 390037, Class 2, and 349594, Class 3) contains 50% Soluble Cresols; stated to be twice as powerful as Phenol.

Ⓟ * **Phenoloid Disinfectant**, *Martindale*, contains 66% of Cresols and has "*Lancet*" C.A. Co-efficient 7·8. It emulsifies with water. An emulsion, *e.g.*, 5% in water mixes perfectly with urine and other Saline matters.

For mucous membranes 0·1% or 10 minims to the pint approx. is efficient.

For general disinfection—utensils, drains, cloths, etc., 1 in 200 to 1 in 500—the stronger (1 tablespoonful to 5 pints), to be used where practicable.

For coughs and throat irritation 20 minims added to 1½ pints of water at 149° F. and inhaled, *e.g.*, in a Portable Inhaler.

Phenoloid Tablets.—*Martindale.*

These are prepared of two strengths, respectively ⅛ and ¼ grain of "Phenoloid" corresponding in activity to 1 and 2 grains respectively of Carbolic Acid. They are flavoured with Lavender. We examined the efficacy of these Tablets as an antiseptic and prepared "plates" from the saliva before and after sucking a tablet. The diminution of bacteria was remarkable.

Uses.—To be slowly dissolved in the mouth in tonsilitis, chronic laryngitis, stomatitis, and in dyspepsia, gastritis and diarrhœa.

Ⓟ*✱**Toxol** (T.M. 353560, Class 2, and 363280, Class 3).—A saponaceous Solution of cresols 2½ times as powerful as Phenol.

Ⓟ*Trikresol, a specialty which is a purified mixture of the three cresols. It is a clear, colourless oily liquid, slightly soluble in water, and is said to have three times the germicidal power of Phenol. For surgical use, ½ to 1% solution. As an eye wash 1 in 1,000 or 2,000.

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* But see par. p. 16.

† Trade Mark 98948, removed from Register (avoided) under Patents, Designs and Trade Marks (Temporary Rules) Act, 1914, but Lysol *Device* 98947, registered by the original owners of the preparation remains. *cf.* Patents, etc. (Temp. Rules) Act, 1914.

Lysol was the name of an article made according to an expired patent. When a patent expires the name of the patented article becomes public property. The name, however, remained on the Trade Mark register until removed under the Patents, Designs and Trade Marks (Temporary Rules) Act, 1914.—C.D. Feb. 20/15.

T.M. 406947 Class 3, by Lysol, Ltd., St. Mary-at-Hill, and 428670, Class 2 Associated, by Lysol, Ltd., Raynes Park, are now on the register—1924.

Ⓟ**Trikresol-formalin.** These substances, in proportion of 4 to 1, form a useful application as a dental dressing.

1% Trikresol is an effective solution for rendering the tooth-brush free from the common pathogenic organisms.

Ⓟ*✱**Typhol** (T.M. 315937).—Described as a Cresylic disinfectant with a uniform Co-efficient of 3.

Ⓟ* **Xykol.**—A substitute for Lysol containing 50% Phenol derivatives, and forming a clear solution with water.

Para-Chloro-Orthocresol in a soap and spirit mixture patented. More potent than Carbolic Acid.—F. W. Howorth, P.J. ii/15,234. See also B.M.J., ii/09,213.

For the Lancet and Rideal-Walker methods of standardising Disinfectants B.P.Conf. Discussion and modifications of the methods, see Vol. II.

ACIDUM FORMICUM.

Syn. **Aminic Acid.** H.COOH=46·021.

Dose.—2 to 10 minims (**0·12** to **0·6** Cc.) *per os* freely diluted, *e.g.*, with mineral water. Hypodermically 2 to 15 minims of 1 in 1,000 dilution of actual acid, but it is intensely irritating. It is better given as Sodium Salt.

A colourless liquid Sp. Gr. 1·061—1·064 (24 to 25% H.COOH). Miscible with water. In concentrated form has a caustic action.

Note :—Formic Acid is obtainable also of Sp. Gr. 1·12=50%, 1·15 =65% ; 1·2=85% ; 1·22=100% H.COOH. As a rule the 25% Acid is referred to.

Uses.—It is alleged that this acid (acting in a manner similar to cantharides) gives tone to the muscles and restrains muscular tremor, as in cases of paralysis agitans, and in chorea. It increases muscular energy and abolishes the sense of fatigue. It is employed usually as one of the salts, *e.g.*, in influenza, gout, rheumatism, tremors, etc.

Nystagmus has been treated by 5 minim doses.

This acid was originally made from the Red Ant, *Formica rufa.* The stinging nettle, *Urtica dioica*, contains formic acid, and has long been employed as a tonic and diuretic.

Succus Urticæ is prepared in strength 1=1.

Dose.—1 to 4 drachms increased if desired. The juice expressed from the fresh plant, preserved with 25% of 90% Alcohol.

Formic Acid is stated to be produced by the growth of *B. rheumaticus* and is a considerable constituent in sweat. *cf. Vol. II.*

Rheumatism, it is said, has been cured by applying bees to joints. Beekeepers it is said are remarkably free from rheumatism.

As a *food preservative* 0·1 to 0·15% pure Formic Acid suffices. It has been suggested as substitute for Citric, Tartaric and Phosphoric Acids in the Mineral Water trade. 3 ounces of 'Alacet' (60% Acid) for 1 gallon of Lemon Syrup. The taste is equal to Syrup made with Citric Acid.

Sodii Formas, H.COONa=68·013.

Dose.—5 to 10 grains (**0·3 to 0·6 Gm.**) in solution, increased if desired to as much as **4 Gm.** per diem.

A white alkaline powder soluble in water. A strong reducing agent and powerful antiseptic. *Incompatible with Acids.*

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* But see par., p 16.

Manufacture.—The Salt should be anhydrous. It can be made by evaporating nearly to dryness on a steam bath and drying at 130° C., or preferably by allowing a solution saturated at 123° C. to cool with constant stirring to 30° C. and drying the crystals at 115° C.—C. H. Hampshire and W. R. Pratt, Y.B.P., 1913,546.

T. Tyrer and F. C. Gosling found 2 H_2O in the crystalline salt.—P.J.ii/12,157;

Uses.—In cases of heart and kidney diseases it is stated to lessen the loss of albumin by the urine, although it has diuretic powers. Does not disagree with the stomach. Said to be non-toxic. Has been employed in phthisis and in pneumonia. Improves appetite, mental and physical activity. Ocular fatigue has been treated with sodium formate instillation 1 in 50 to 1 in 30. Rheumatism has improved by 15 grain doses.

Diphtheria has been treated with 5 to 10 minim doses of 25% solution in water every 4 hours.

Sterules of Sodium Formate contain $\frac{1}{8}$ and $\frac{1}{2}$ grain.

Elixir Sodii Formatis. *Dose.*—2 drachms (**8 Cc.**).

Sodium Formate 4, Essence of Vanilla, *q.s.*, Simple Syrup, *q.s.*, to 100.

Calcii Formas, $(H.COO)_2Ca=130{\cdot}096$.

Dose.—3 to 5 grains (**0·2 to 0·3 Gm.**).

White crystals soluble 1 in 10 of water. More permanent than the Sodium Salt. For hæmorrhages has been found useful.

Sterules of Calcium Formate contain $\frac{3}{4}$ grain (**0·05 Gm.**).

Ferri Formas. **(Ferric Formate.)**

$Fe_3(OH)_2.(HCOO)_7.4H_2O=588{\cdot}691$.

Dose.—$1\frac{1}{2}$ to 3 grains (**0·1 to 0·2 Gm.**).

Red crystals soluble in water about 1 in 19 at 17° C. but solutions are unstable.

Lithii Formas, H.COOLi, $H_2O=69\,969$. White crystalline powder freely soluble in water.

Dose.—1 to 5 grains (**0·06** to **0·3Gm.**). As much as $1\frac{1}{2}$ Gm. of this salt have been given daily.

Uses.—Similar to the above and has been given in gout.

Magnesii Formas, $Mg.(HCO_2)_2 2H_2O=150{\cdot}378$.

Dose.—3 to 10 grains (**0·2 to 0·6 Gm.**).

Colourless crystals soluble in water.

Potassii Formas, $H.COOK=84{\cdot}113$.

Dose and use similar to the Sodium Salt.

Crystalline powder very soluble in water forming neutral solution. Owing to hygroscopic tendency the commercial salt is about 95% pure

℗ **Strychninæ Formas,** $C_{21}H_{22}N_2O_2.HCOOH.=380{\cdot}318$.

Dose.—$\frac{1}{64}$ grain (**0·001 Gm.**).

White crystalline powder, soluble in water about 1 in $3\frac{1}{2}$. A nerve stimulant and muscular tonic.

It is best prepared in the anhydrous condition by drying at below 85° C.

℗ **Syrupus Formatum Compositus** (*Syn.* **Elixir Formatum Compositum**).

Dose.—1 to 2 drachms (**4 to 8 Cc.**). One drachm contains Formates of Sodium and Potassium each 2 grains, Calcium 1 grain, Quinine $\frac{1}{5}$ grain, Strychnine $\frac{1}{100}$ grain, Formic Acid 2 minims, Cochineal and Vanillin Solutions each $\frac{1}{5}$ minim, Lemon Oil $\frac{1}{60}$ minim, Alcohol 90%, Water and Syrup in proportion 1, 1, 6 *q.s.* to 1 drachm.

ACIDUM GLYCEROPHOSPHORICUM.

$C_3H_5(OH)_2O.PO.(OH)_2 = 172{\cdot}127.$

Dose.—5 to 10 minims (**0·3 to 0·6 Cc.**) of 25% acid.

Manufacture.—This dibasic acid forms a colourless, sour liquid, miscible with water and alcohol. It may be prepared by heating Glycerin with two-thirds of its weight of Phosphoric Acid 60%, at not exceeding 105° C. Fumes are given off. The resulting liquid is neutralized with calcium carbonate. The solution of Calcium Glycerophosphate is concentrated *in vacuo* or precipitated by alcohol, collected and dried. This may be converted into the (purified) acid or other salts.

It is usually made 25% strength and has Sp. Gr. 1·125. A 50% Acid is also supplied in commerce.

The following are patented Methods.—**No. 19,319 of 1911**, by Aug. Zimmermann for Chemische Fabrik auf Actien, Berlin. Glycerophosphoric Acid is made by causing Phosphoric Acid in *statu nascendi* to act on Glycerin by using a Phosphate and an acid substance, either a free acid or acid salt. *Now void.*

No. 2806 of 1912, by Southall Bros. and Barclay and C. S. Roy. This process relates to the direct production of pure Mono-glyceryl Ester of Phosphoric Acid. Phosphoric Acid Sp. Gr. 1·75 and Glycerin Sp. Gr. 1·26 are heated at 100° to 105° C. at a pressure of about 30 mm. of Mercury, 24 to 48 hours and the product is further treated for production of Salts. The essential features of the patent are uniform product, not a mixture of several esters. Low temperature employed, *i.e.*, no carbonisation. A good yield of colourless Acid.

No. 2881 of 1912, by the same patentees, relates to the production of Glycerophosphates by mixing Oxides, Hydroxides, Carbonates or Phosphates of Calcium, Barium, Strontium, etc., with Phosphoric Acid, adding the required amount of Glycerin and heating to 140° to 220° C. The further procedure varies according as Acid or Neutral Salt is required.

Uses of the Glycerophosphates.—The Glycerophosphates were originally introduced into medicine by Robin, on the grounds that Lecithin (*q.v.*) an omnipresent, complex fatty body, contains its phosphorus in the form of the Glycerophosphoric radical. Opinion at that time was to the effect that the Glycerophosphates are assimilated as such and are excreted as phosphates. Prof. W. E. Dixon says that evidence does not support the view, and that such portion of Glycerophosphates given therapeutically that is not excreted unchanged per rectum is almost certainly absorbed as inorganic phosphate. Inorganic phosphates are absorbed at least as readily as organic ones, *e.g.*, Glycerophosphates. According to him it has been shown that a diet rich in phosphorus, *e.g.*, eggs, etc., or the administration of either organic or inorganic phosphates produces no marked effect on protein metabolism. The facts suggest that there is no advantage gained over inorganic by organic phosphates.

Robin states that the phosphorus of the Glycerophosphate is excreted in the urine as inorganic phosphate. In practice the general view is that the Glycerophosphates act as tonics. Robin held that these compounds *aid metabolism.* Viewed chemically

the Glycerophosphates are labile compounds and for this reason they may be more acceptable to the tissues than inorganic bodies.

Merck (Jahresbericht, 1911 issued 1912), mentions that the bones of man contain as much as 1200 to 1500 Gm. of Phosphorus in the form of neutral Calcium Phosphate. The importance of Phosphorus-metabolism is seen in the fact that 3 to 4 Gm. of Phosphoric Acid are passed daily by an adult. This is obtained mostly from vegetable food and to some extent from the decomposition of Nucleins and Lecithins. Increased excretion of Phosphorus is thought to be associated with increased nerve activity. A reduction of the amount eliminated has been seen in various diseases, *e.g.*, arthritis, diabetes, acute atrophy of the liver, kidney affections, etc. The fact of decreased Phosphate excretion in pregnancy shows simply that the fœtus requires Phosphorus for bone formation. Increased output of Phosphorus occurs in digestive disturbance, body fatigue, nerve and bone diseases

Experiments showed in the use of Phosphorus and inorganic phosphates that they have little effect on metabolism. Thus Sodium Phosphate soon appears in the urine when given subcutaneously or intravenously. Internally it acts almost entirely as a purgative. The use of Phosphorus as such has not had great success so far as actual bone formation is concerned.

Consequently with the discovery of Glycerophosphoric Acid in egg yolk, the fact that Lecithin is split up into Choline and Glycerophosphoric Acid in the system, led to the use of the Glycerophosphates in medicine.

It was determined that Glycerophosphoric Acid and its salts represent the condition of Phosphorus occurring in metabolism and which is best for assimilation in the organism. Even large doses of the Glycerophosphates are harmless, whilst small ones possess utility.

Robin held that the Glycerophosphates have a powerful nutritive action and in general improve metabolism, especially Nitrogen metabolism. In addition there is increased Phosphorus assimilation by nerve tissue—hence operating as a direct Phosphorus sparer for the nervous system.

The Glycerophosphates are extensively prescribed for all forms of wasting disease. The Compound Syrup and Glycerol of Glycerophosphates, the Syrup of Glycerophosphates with Formates, and many of the Milk and Glycerophosphate preparations are credited with tonic properties for use in certain devitalised conditions, *e.g.*, during convalescence from serious illness.

For the Chemical Examination of Glycerophosphates and Tests for Purity see Umney and Bennett, P.J. ii./14,134.

Phosphates in glycerophosphates—determination of small quantities by means of Ammonium Molybdate.—J. L. Lizius, P.J. i./21,478.

Calcii Glycerophosphas (Neutral), $C_3H_7O_3.PO_3Ca = 210{\cdot}181$ or $+H_2O = 228{\cdot}197$, Fr. Cx., P. Belg. P. Helv. has $+2\ H_2O = 246{\cdot}213$. U.S. IX. requires 98% anhydrous salt. Ph. Ital. IV. "In commerce with 1 to 2 mols. of water."

Dose.—3 to 10 grains (**0·2 to 0·6 Gm.**) in water or considerably more, *vide infra.* Slipule No. 1 holds 5 grains.

This salt is formed, together with choline, on the breaking up of lecithin in the process of digestion.

Manufacture.—By reaction of Glycerophosphoric Acid with Milk of Lime, removing Lime in solution with Carbon Dioxide and concentrating (*cf.* also Patented Methods *antea*). A white crystalline powder.

Soluble in cold (about 1 in 40, but different makers' products vary), only slightly so in hot water, soluble also in glycerin, insoluble in alcohol.

Uses.—Stated to improve nutrition of the nervous system in all cases where nerve activity is enfeebled; may be given hypodermically, 2 to 4 grains daily in water. **Sterules** contain one

grain, also 2 grains and 3 grains. It is useful *per os* for incontinence of urine.

Incompatible with soluble Carbonates and Phosphates.

For deficiency of Calcium in the blood. Bold doses required. The soluble Phosphates have power in increasing coagulability of the blood.

Severe urticaria has been cured by Calcium Glycerophosphate—Lime Salts said to be specific.

Neurasthenia. Treatment of.—Glycerophosphates useful in some cases.—J. S. Risien Russell. L. ii./13,1456.

Pulvis Calcii Glycerophosphatis cum Lacte Exsiccato.

Milk and Glycerophosphate.—*Martindale.*

Dose.—One heaped tablespoonful (½ ounce), mixed with 4 to 5 ounces of hot (nearly boiling) water, two or three times daily.

This preparation is intended as a restorative and nutritive. It contains 5 grains of Calcium Glycerophosphate in the above dose combined with *all* the solids of fresh milk.

Our experiments show that a preparation on these lines keeps well and retains a good flavour. Dried Casein alone is sometimes used for preparations of this kind, but in this case the Milk Fat, Salts and Sugar are eliminated, and Dried Caseins of commerce are not always readily soluble even with added alkali.

Phosphorus and Nitrogen retention are likely to improve under a food of this kind.

Has proved of value in the feeble for inducing sleep.

✱ **Vitafer** (T.M. 347470 also 324675 and 333647, Class 3; also 329754 and 334627 (assoc.) and 346425 (assoc.) in Class 42) and ✱ **Cibrola** (T.M.319735, Class 42) are preparations of this description—the former containing the Glycerophosphates of Lime and Sodium.

Calcii Glycerophosphas Solubilis consists of the Neutral Glycerophosphate with Citric Acid added to render it soluble 1 in 25.

Umney and Bennett would prefer this for making Syrups providing it contains at least 15% Ca.—P.J. ii./14,134.

Pilula Glycerophosphatum.

Dose.—One thrice daily after food.

Calcium, Magnesium, Potassium and Sodium Glycerophosphates of each 1 grain.

Mix the Potassium Salt or equivalent of 50 or 75% solution with powdered Liquorice Root ½ grain and place on water bath heated to 130° F. not higher. Remove the heat, stir the mixture occasionally and when it attains the consistence of a pill mass add it to the other Glycerophosphates previously triturated with Kaolin ½ grain and beat well into a mass. Supply in a bottle. A pill so prepared disintegrates completely in water at 45° F. in half an hour.

Ferri Glycerophosphas (Ferric Glycerophosphate)

Dose.—1 to 5 grains (**0·06 to 0·3 Gm.**). In yellowish powder containing approx. 15% of Iron—slightly soluble in water, or in the more soluble brownish-yellow scales.

Flavoring.—Syl Lavandulæ, Syl Vanillæ, Syl Limonis.

Vinum Ferri Glycerophosphatis contains 1%, with Glycerin 5% in Sherry. **Sterules** contain ½ grain (**0·03 Gm.**).

℗Compound Iron Glycerophosphate Capsules.

Dose.—Once thrice daily after meals.

Iron Glycerophosphate, Beta Naphthol of each 3 grains, Extract of Nux Vomica and Indian Hemp of each ¼ grain, Compound Galbanum Pill 1½ grains.

For anæmic patients in dyspepsia.—G. Rankin, B.M.J. i./15,1036.

Lithii Glycerophosphas $C_3H_7O_3.PO_3Li_2=184·021$

Dose.—3 to 10 grains (**0·2 to 0·6 Gm.**)

White amorphous powder soluble in water.

Magnesii Glycerophosphas. $C_3H_7O_3.PO_3Mg=194·431.$

Dose.—3 to 10 grains (**0·2 to 0·6 Gm.**).

A white amorphous powder, soluble in water (1 in 41). May be rendered soluble by addition of Citric Acid.—Umney. P.J. ii./14,134

We found 1% of Citric Acid increases the solubility to about 1 in 35, 5% to 1 in 25, 10% to 1 in 20. Glycerophosphoric acid added gives the figures 1 in 33, 1 in 24 and 1 in 18 respectively.

Manganesii Glycerophosphas. $C_3H_7O_3.PO_3Mn=225·041.$

Dose.—1 to 5 grains (**0·06 to 0·3 Gm.**).

Is reddish white in colour, only slightly soluble in water.

The relative anæmia which is often associated with cardiac over-strain may well be treated by administering Manganese Glycerophosphate with Hæmoglobin.

Potassii Glycerophosphas. $C_3H_7O_3.PO_3K_2 + 3H_2O = 302·359.$

Dose.—3 to 8 grains (**0·2 to 0·5 Gm.**); hypodermically 3 to 5 grains (**0·2 to 0·3 Gm.**).

A yellowish liquid in 50 and 75% solutions and 100% (solid).

Quininæ Glycerophosphas. *Syn.* KINEURINE.

Dose.—3 to 8 grains (**0·2 to 0·5 Gm.**).

$C_3H_7O_3.H_2PO_3.(C_{20}H_{24}N_2O_2)_2.4H_2O=892·807.$ FR. CX. has the compound with $5H_2O$, termed 'basic' quinine glycerophosphate in France. A white powder, soluble in alcohol, but only very slightly in water.

Sterules contain ½ grain (**0·03 Gm.**).

Sodii Glycerophosphas.

Dose.—5 to 10 grains (**0·3 to 0·6 Gm.**), *per os*; also given hypodermically in 3 to 5 grain doses.

U.S. IX. requires 68% of Anhydrous Salt. This is equivalent to 85% of the compound + $3H_2O$.

It is supplied commercially in the following forms :—

Dry Pieces or Powder 100% $C_3H_7O_3.PO_3Na_2,3H_2O=270·159.$ Very soluble in water. Hygroscopic. **Solution** 75%, a translucent straw-coloured mass which cannot be poured without warming. **Solution** 50%, syrupy fluid convenient for dispensing.

This latter strength is official in the FR. CX. U.S. IX. has under the name LIQUOR SODII GLYCEROPHOSPHATIS a 50% solution of Anhydrous, corresponding to about 74% of Crystalline Salt.

Sterules of Sodium Glycerophosphate contain 3 grains (0·2 Gm.). Also Ⓟ Sodium Glycerophosphate 1½ grains with Strychnine Cacodylate $\frac{1}{64}$ grain and with $\frac{1}{20}$ grain.

Uses.—In nervous affections, facial neuralgia, Addison's disease, lumbago, phosphaturia, anæmia and general debility.

✱**Glycolactophos** (T.M. 344300, Class 42) is stated to have the formula Sodium and Calcium Glycerophosphate of each 2½%, Casein 95%. In neurasthenia, and where in nerve affections there is phosphatia, in rickets and allied conditions.

Dose —2 teaspoonfuls, twice or thrice daily in milk or water.

✱**Sanaphos.** (T.M. 363457, Class 3, and 363458, Class 42).

Dose.—Two large teaspoonfuls thrice daily in Water, Milk, etc.

An organically phosphated milk product. 80% is rapidly soluble in cold water and amongst the soluble portions, 25% consists of casein itself containing also milk albumen. Associated with this soluble casein is an organic phosphorus compound with a total Phosphorus content 0·7%. Completely and readily miscible with water In neurasthenia, enfeebled nervous conditions, etc.—L. ii./14,853.

Sanatogen (T.M. 246802, Class 42, and 257583, Class 3), registered 1902 and 1903. Both *removed* from the Register, Oct. 1916, by order of the Board of Trade. The name is public property. ✱**Genatosan** (T M. 374966 and 378884, Class 3, and 385040, Class 42 Assoc.) is a new name for **Sanatogen**. Genatosan Ltd., applied Jan. 30, 1919 to have the order in question ***revoked***, but the application to restore the mark was unsuccessful.)

Sanatogen is made by combining 5% of Sodium Glycerophosphate with Casein. Care is taken to free the Casein from fat, this being accomplished by a suitable solvent.—C.D. Dec. 19/14, Ind. fo. 832.

PATENT 1541/1898 (***expired*** 1911). According to this, the casein is mixed with water containing alcohol or other indifferent liquids and rendered soluble by adding the Sodium Glycerophosphate while stirring.

As it contains 95% of Casein one ounce is equivalent to 28·5 Gm. Protein, yielding 117 calories, which is equivalent to the number given by ½ of a pint of milk.—J. Am. Med. Ass. 1911, vol. 56, p. 1345. Experiments employing Sanatogen (as a purin-free protein food) on frogs to determine changes in nuclei of blood cells. Also on one of the authors of the paper. The statement is made that Sanatogen stimulates the cells to undergo nuclear division.—L. ii./12,1072.

✱**Sanagen** (T.M. 370293, Class 3, and 364196, Class 42), manufactured in this country a short time after the expiry of the above patent, is similar. Consists of Sodium Glycerophosphate plus the pure Casein of Milk. Analysis showed 75% Proteins and Phosphoric Anhydride equivalent to Sodium Glycerophosphate 12½% (the Sanatogen equivalent being 9·28%). Vitamines were probably removed by the Alcohol and Ether washing, but the Alcohol and Ether washing is not done in the case of Sanagen. Further, it contains no milk sugar or added sugar.—Truth, Nov. 22, 1916. It is a tonic and invigorating nerve restorative.

✱**Valkasa.** (T.M. 329712, Class 42).—A combination of soluble milk casein with glycerophosphates.

✱**Visem** (T.M. 334359 Class 3 and 336808 Class 42) is stated to consist of Milk Casein and Whey Powder with 3% each of Ovo-lecithin and Sodium Glycerophosphate. It hence contains lactose and lactalbumen, and is intended as a nerve food.

Tablets are prepared weighing 40 grains approx. and containing 1 grain each of lecithin and the glycerophosphate, in addition to the Milk Compounds.

Dose.—One thrice daily at intervals of 5 hours, increased to 2 or 3 tablets; children one tablet at 11, and 5 daily, increased to 2 tablets at a time.

Strontii Glycerophosphas. $C_3H_7O_3.PO_3Sr = 257·741$.

Dose.—3 to 8 grains (**0·2 to 0·5 Gm.**).

White powder only slightly soluble in water.

May be prepared from the Sodium Salt by double decomposition with Strontium Bromide.

℞ **Strychninæ Glycerophosphas.**
Dose.—$\frac{1}{64}$ to $\frac{1}{20}$ gr. **(0·001 to 0·003 Gm.)**
White crystalline powder, soluble in water. A 'tonic.'

Confectio Glycerophosphatum Composita. *Martindale.*
Dose.—1 to 2 drachms **(4 to 8 Cc.)**.

Calcium glycerophosphate 2½, Iron glycerophosphate 2, Sodium glycerophosphate 2½, Lecithin ½, Citric Acid 1½, Glyl Anisi 12, Pepsin 1½, Full Cream Dried Milk to 120.

This preparation has restorative, nutritive and digestive properties.

Confectio Glycerophosphatum cum Malto. *Martindale.*
Dose.—1 to 2 drachms **(4 to 8 Cc.)**.

Contains the glycerophosphates as in the last mentioned in a basis of Malt Extract. It does not contain Pepsin.

Elixir Glycerophosphatum.
Calcium and Sodium Glycerophosphates of each 2, Iron Glycerophosphate 1, Aromatic Syrup 250. *Dose.*—1 to 4 drachms.

℗ **Glycerinum Glycerophosphatum Compositum.**—*Syn.* GLYCEROLE OF GLYCEROPHOSPHATES. *Dose.*—1 to 2 drachms **(4 to 8 Cc.)**.
Cudbear ¼ ounce, Water 10 ounces. Boil 10 minutes, strain, and dissolve in the warm liquor—Calcium Glycerophosphate 160 grains, Potassium, Sodium, and Magnesium Glycerophosphates of each 80 grains, Iron Glycerophosphate 40 grains, Citric Acid 30 grains; add Tincture of Kola 10 drachms, Tincture of Ignatia Amara 1 ounce, and Glycerin *q.s.* to 1 pint. This is more palatable than if made with Strychnine and Caffeine. It keeps well, is suitable for export, and for patients who may not take sugar.

Glycerinum Glycerophosphatum cum Medulla Rubra. GLYCEROLE OF GLYCEROPHOSPHATES WITH RED BONE MARROW.
Dose.—1 to 2 drachms **(4 to 8 Cc.)**.
Dissolve Calcium Glycerophosphate 80 grains, Iron Glycerophosphate 20 grains, Magnesium Glycerophosphate 40 grains, Manganese Glycerophosphate 20 grains, Potassium Glycerophosphate 40 grains, Sodium Glycerophosphate 40 grains, and Citric Acid 15 grains in Distilled Water 10 ounces; then filter and add Chloroform 5 minims, Alcohol (90%) 40 minims, Orange-flower Water 1 drachm, Cherry laurel Water 1½ drachms, Glycerin Extract of Red Bone Marrow 10 ounces.—P.J. i./o6,385. Given in rickets and debility.
The writer prepares this Glycerol with four times the amount of Chloroform, *i.e.*, 1 in 480.

Granular Effervescent Glycerophosphates.
Dose.—60 grains **(4 Gm.)**.
Contains in 1 drachm, Glycerophosphate of Calcium 3 grains, of Iron 1 grain, of Magnesium 3 grains, of Potassium 3 grains, with Caffeine Citrate 1 grain. A palatable mode of administration.

Malted Glycerophosphates.
Dose.—1 to 4 drachms **(4 to 15 Cc.)**.
Sodium Glycerophosphate 1, Potassium Glycerophosphate 1, dissolved in Water 30, with Liquid Extract of Malt to 120.

A very slight deposit forms. Experiments with a view to including other glycerophosphates, *e.g.*, those of magnesium and calcium did not give preparations which will remain clear.

℗**Syrupus Glycerophosphatum Compositus,** B.P.C.

Dose.—1 to 2 fluid drachms (**4 to 8 Cc.**). 1 drachm contains 1/80 grain Strychnine with Calcium Glycerophosphate $1\frac{1}{4}$ grains, Potassium, Sodium and Magnesium Glycerophosphates of each $\frac{5}{8}$ grain, Iron Glycerophosphate and Caffeine each $\frac{5}{16}$ grain—with Glycerophosphoric Acid and Cudbear (*q.v.*, Vol. II.), to colour.

℗**Capsules** are prepared equivalent to $\frac{1}{2}$ and 1 drachm.

℗**Pulvis Glycerophosphatum Compositus.**

Dose.—1 to 2 drachms (**4 to 8 Gm.**).

Glycerophosphates of Calcium 2·0, Potassium (100%) 1·0, Sodium 1·0, Magnesium 1·0, Iron 0·5, Caffeine 0·5,Strychnine Hydrochloride 0·024 (use Trituration 0·24), Powdered Sugar to 100. This keeps satisfactorily in corked bottles.

Compound Glycerophosphate Tablets are prepared containing in each the same quantities as the Syrup per drachm but without strychnine. To be crushed and taken in a little warm water.

℗**Syrupus Glycerophosphatum cum Formatibus** (*Martindale*).

Syn. **Elixir Glycerophosphatum cum Formatibus.** Contains Sodium and Potassium Formates of each 5 grains added to each drachm of a compound Glycerophosphate Syrup (made with Acetic Acid).

℗**Syrupus Glycerophosphatum** (*Robin*) is a special preparation.

Dose.—1 to 4 drachms (**4 to 15 Cc.**).

The original formula by Dr. Robin was given in the *Bulletin General de Therapeutique*, May 30, 1895, as follows :—Glycérophosphate de Chaux 6 Gm., de Soude, de Potasse, de Magnésie aa. 2 Gm., de Fer 1 Gm., Teinture de fêve de St. Ignace 30 gouttes, Pepsin 3 Gm., Maltine (diastase) 1 Gm., Teinture de Kola 10 Gm., Sirop de Cerises (pour compléter) 200 Gm. *The formula is impracticable.*

Emulsio Olei Morrhuæ et Glycerophosphatum.

Dose.—2 to 8 drachms (**8 to 30 Cc.**).

Contains the Glycerophosphates of Calcium, Iron, Magnesium, Potassium and Sodium, combined with Cod Liver Oil Emulsion, containing 50% Cod Liver Oil. Is a useful nutrient combination.

✱**Jecovol** (T.M. 315237 and 318395) is a proprietary Emulsion of Cod Liver Oil with Sodium, Calcium and Iron Glycerophosphates.

℞ *Sérum Névrosthénique Ampoules* (*Fraisse*) contain 0·1 Gm. Sodium Glycerophosphate and 0.0005 Gm. Strychnine Cacodylate, for hypodermic injection. In neurasthenia and other nervous affections.

℞ *Drops* are also prepared for use by the mouth.

Dose.—15 minims (1 Cc.) daily for 12 days ; allow an interval of five or six days and recommence if necessary.

℞ *Ferruginous Ampoules* (*Fraisse*), contain Iron Cacodylate 0·01 Gm. ($\frac{1}{6}$ grain), Sodium Glycerophosphate 0·1 Gm. ($1\frac{1}{2}$ grains) and Strychnine Cacodylate 0·0005 Gm. ($\frac{1}{120}$ grain) in 1 Cc. Dosage as above.

ACIDUM HYDROBROMICUM.

HBr=80·928.

Acidum Hydrobromicum Concentratum.

Hydrobromic Acid of Sp. Gr. 1·308=35%, colourless or straw-coloured, when diluted; one volume with three of distilled water produces an acid of 10% strength. Should be kept from sunlight. If of Sp. Gr. 1·260=30%; 1·375=40%; 1·450=45%.

Incompatible as Acid Hydrochloricum, *q.v.*

Acidum Hydrobromicum Dilutum (*Off.*); U.S., Fr. Cx.

Dose.—15 to 60 minims (1 to 4 Cc.); 60 minims=10 grains of potassium bromide approximately. Contains 10% of hydrogen bromide. Sp. Gr. 1·077. May be prepared by the action of Phosphoric Acid on Potassium Bromide. Sulphuric Acid is unsuitable owing to secondary decomposition. A colourless, very sour liquid, without odour.

Uses.—To allay nervous excitability and exhaustion, as a solvent for quinine and preventing quinism, and as an alternative for potassium bromide is less liable to cause acne; 8 minims will dissolve 5 grains of quinine sulphate in water, given with morphine to allay after effects. Obviates the sense of fulness of the head felt when taking iron for anæmia; also removes effects of excess of tea or alcohol; and to calm excited heart. It is useful for tinnitus aurium and tickling hacking cough at night, in doses of 10 minims or more, and in headache, with flushing in the face and ringing in the ears. In vertigo it is successful and it relieves toothache. In epilepsy, up to ½ ounce well diluted may be given; even to 3 ounces daily.

'Bon Voyage,' a specialty for **sea sickness**, of some service, contains, *inter alia*, this acid and sodium bromide.—B.M.J. ii./09, 1818.

Dose.—Half an ounce in a wineglassful of water at 6 and 3 hours before embarking, and once a day for the first two days of the voyage, afterwards in half doses if required.

Bon Voyage Tablets are also prepared, 2 being equivalent to ½ ounce dose.

ACIDUM HYDROCHLORICUM.

HCl=36·468.

"*Poisonous—Not to be taken.*"

For retail in Great Britain and Ireland, the box, bottle, vessel, wrapper, or cover in which the acid is contained must be distinctly labelled with (1) *the* **name of the substance**; (2) *the words* "**Poisonous—not to be taken**"; (3) *the* **name and address** *of the seller. Any liquid substance to which Section 5 of the Poisons and Pharmacy Act*, 1908, *—Restrictions on sale of certain Poisonous Substances—applies (to wit, Hydrochloric, Nitric and Sulphuric Acids, Soluble Salts of Oxalic Acid, Liquid preparations containing more than 5% by weight of free Ammonia, and all liquid preparations sold as Carbolic, etc., containing not more than 3% Phenols,—see Poisons Schedule), shall not be delivered except in bottles or other containers, rendered* **distinguishable by touch** *from ordinary bottles or containers.*

Off. has Sp. Gr. 1·160. Contains 31·79% by weight HCl. PH. NED. and P. HELV. 25%. FR. CX. 33·65%. P.G.V. 24·8 to 25·2%. Ph. Ital. IV. 37·39%.

Antidotes.—Alkalis, sal volatile, saccharated lime, calcium carbonate, alkaline bicarbonates, carron oil, white of egg, morphine, lime water, magnesia, milk, soap and water. Give beef tea enema and stimulants.

Incompatible with alkalis, alkaline carbonates, metallic oxides, silver and lead salts.

Use.—Escharotic.

Alimentary toxæmia.—BOUCHARD'S REMEDY: fuming hydrochloric acid 5 to 10 m. freshly mixed at the time of administration with 6 to 8 ounces of water and taken with every meal. Of great value—reinforces the antiseptic power of the gastric juice.—W. Armstrong.—L. i./13,1384.

Neuritis treated by applying strong Hydrochloric Acid to the skin along the line of the inflamed and painful nerve on a wad of cotton wool. Results striking and appreciated (H. Wingfield's treatment).—H. Sainsbury, L. i./17,911.

The treatment was described 20 years ago. It was discovered accidentally. R. A. Bayliss reported cases successfully treated.—L. ii./17,57.

Hydrochloric Acid, arsenic-free may be made by warming with pure fine copper gauze, and then distilling.

Acidum Hydrochloricum Dilutum (*Off.*).

Dose.—5 to 20 minims (**0·3 to 1·2 Cc.**).

Is prepared by diluting 28·44 by vol. of the strong acid with water to 100. Sp. Gr. 1·048. Contains *Off.* U.S., P. Helv. and F. NORSK, 10% HCl by weight. Ph. Ital. IV. 7.07%, PH. NED. is quadrinormal.

Use.—Tonic biliary stimulant. In dyspepsia, where insufficiency of acid. In pernicious anæmia strong Hydrochloric Acid 10 to 15 drops given in mucilage has been found useful. (M.A. 1911, 149). Gargle 1 in 50 to 1 in 100 for sore throat. When diluted forms a useful refrigerant drink and lotion.

In dilatation of the stomach 10 to 15 minims after each meal may be given with or without 6 to 8 grains of Pepsin.

Relation of gastric secretion to rheumatoid arthritis, the latter being often associated with some focus of pyogenic infection,—*e.g.*, frequently oral sepsis. In nine cases there was indication of chemical changes in the gastric secretion (*a*) diminution in the amount of free Hydrochloric Acid and also the active Hydrochloric Acid, (*b*) an excess of Mineral Chlorides pointing to a process of neutralisation, and (*c*) a comparatively low ratio between the active HCl and the Mineral Chlorides. An acid mixture containing Dilute Hydrochloric Acid 5 minims, Glycerol of Pepsin 20 minims, Clove Oil 1 minim, Tincture of Quillaia 20 minims, Aniseed Water to ½ oz. *Dose*—thrice daily. Cases benefited.—A. S. Woodwark and R. L. MacKenzie Wallis.—L. ii./12, 943.

The regulation of the alkaline balance of the blood, and through it of the tissue fluids, is one of the most important functions of the kidneys. Treatment with Hydrochloric Acid largely regulates the amount and character of the urine excreted by its action on the renal tissue. Where acid is being administered in doubtful cases the blood pressure should always be observed to avoid overdose.—J. Campbell McClure and H. A. Ellis, L. ii./21,271.

Rickets treated with Hydrochloric Acid.—B.M.J.E. i./24,69.

✱**Oxyntin** (T.M. 274899). *Dose.*—5 to 15 grains (**0·3 to 1 Gm.**).
An Albumin-Hydrochloric Acid compound. Contains 5% by weight of Hydrochloric Acid (HCl). Ten grains are equivalent to 5 minims of Dilute Hydrochloric Acid instead of which it may be prescribed.
It is readily miscible with water, with slightly acidulous taste, suggested in gastric disorders to increase HCl content.—B.M.J. i./15,807.

ACIDUM HYDROCYANICUM.

Prussic Acid (Scheele's Strength).
℗1 *Prussic Acid and all preparations or admixtures containing* 0·1 *or more* % *of Prussic Acid* (i.e., *Hydrogen Cyanide*), e.g., *Aqua Laurocerasi, q.v.*
Applicable to Ireland.—℗1 "*Prussic Acid*" *only.*
℗ *All preparations or admixtures containing less than* 0·1% *Prussic Acid* (*Hydrogen Cyanide intended*).
Manufactured by distillation of Potassium Ferrocyanide with dilute Sulphuric Acid.
Dose.—1 to 3 minims (**0·06 to 0·2 Cc.**).
Colourless liquid with powerful odour Sp. Gr. 0·994. Contains 4% HCN=27·021.

Antidotes.—Emetics immediately, stomach tube, brandy, or ether, fresh air, inhaling ammonia, artificial respiration (20 per minute). $\frac{1}{50}$ grain atropine hypodermically. Hydrogen Peroxide and Chlorine Water have been given.
Dissolve about 15 grains of Ferrous Sulphate and about 20 minims of Tincture (or Solution) of Ferric Chloride in a wineglassful of water, then add 1 to 2 drachms of Magnesium Carbonate, previously made into a thin cream with water. Mix and give and repeat *s.o.s.* These quantities are equivalent to about 100 minims of Dilute Hydrocyanic Acid, B.P.—St. Bart's. H.
As a ***Bactericide (fumigant in ship disinfection)*** Hydrocyanic Acid is too weak to affect pathogenic germs. It has no measurable Carbolic Acid Co-efficient. *Less than* 0·02.—W. C. Reynolds, L. ii./22,834. Its danger. P.J. i./23,300.
To destroy bugs Hydrocyanic Acid is much used in S. Africa. Stringent regulations control its use and the licensing of disinfectors employed.—C. Porter, L. ii./21,583.

℗1 **Acidum Hydrocyanicum Dilutum** (*Off.*), U.S. Ph. Ned. P. Belg. Fr. Cx. (previously 1% only). *Syn.* Dilute Prussic Acid.

Dose.—2 to 5 minims (**0·12 to 0·3 Cc.**). Fr. Cx.—Max. single dose 1½ minims (**0·1 Gm.**); Max. during 24 hours 8 minims (**0·5 Gm.**).
Contains 2% HCN, Sp. Gr. 0·997. F.I. requires this strength. Keep in inverted stoppered bottles in the dark.
For the estimation of Hydrocyanic Acid and detection of minute amounts in Toxicological work, see Vol. II.

Flavoring.—Glyl Lavandulæ, Glyl Menthæ Piperitæ; Spiritus Menthæ Piperitæ; Syrupus Zingiberis.

Incompatible with soluble silver, mercury and iron salts.

Uses.—In dyspepsia with pain, combined with bismuth or sodium bicarbonate. To allay vomiting and cough. It is very useful as a sedative in an effervescing mixture, and as a 2% dilution as lotion to soothe the itching of pruritus ani or pruritus vulvæ, or general prurigo. Must not be used to broken skin surface.

To promote healing of acute gastric ulcer bismuth, according to some, is of no particular value, but dilute hydrocyanic acid 5 minims in two drachms water is useful for vomiting.

℗Lotio Acidi Hydrocyanici cum Sodio, L.H.

Diluted Hydrocyanic Acid 8·3, Borax 9·2, Sodium Bicarbonate 9·2, Water to 1000. As a soothing eye lotion.—**R.O.H.** has 1% of each.

ACIDUM HYPOCHLOROSUM.

$HClO = 52{\cdot}468$.

Hypochlorous Acid, as such, has not been isolated. In solution and especially in the form of its salts—the Hypochlorites, *e.g.* those of Calcium and Sodium, it has played an important part in many chemical processes.

The method of treating Chloride of Lime with Boric Acid in excess, as advocated during the war, was recognised in the past as a method of making solutions of Hypochlorous Acid.

The acid in dilute solution is practically colorless; in a concentrated form it is yellowish. It readily undergoes decomposition with formation of chlorine, chloric acid, oxygen and water. It is hence a strong oxidising agent and for this reason a bleaching agent.

Medicinally the Chlorinated Soda Solution was a popular detergent during the last half century, but has latterly fallen into dissuetude. The Hypochlorites were, however, resuscitated and were extensively employed for wound treatment in the war as described in the following pages.

Calx Chlorinata. (*Off.*) Sel de Javelle. A dull white powder having about 30% available Chlorine. Solutions of 0·25 to 0·5% applied to burns and ulcers heal them rapidly.

The best commercial samples do not contain more than 70% of Calcium Chloro-hypochlorite ($CaOCl_2$).—J. McCrae, P.J. i./20,273, *i.e.* 39% available Chlorine.

25,000 gallons of water can be sterilised for less than 1d. by aid of Calx Chlorinata.—Thresh, L. ii./08,1597,1846.

Water sterilisation with Calcium Hypochlorite for troops on active service.—Sims Woodhead, B.M.J. ii./14,494

Chlorination of Potable Water. 1 ounce of Chloride of Lime to 2000 gallons. Remove taste by a few crystals of Sodium Hyposulphite.—Ministry of Health Circular, L. ii./21,671. *cf.* also Vol. II.

Unguentum Calcis Chlorinatæ.

Chilblains can be cured with 10% strength in Paraffin Ointment.

Gonococcal arthritis in women has been treated by vaginal douching twice daily with solution of calx chlorinata 1 in 100. Afterwards a solution of Hydrogen Peroxide is freely used.

Phthisical sufferers advised to work at bleaching powder factories. Interesting data concerning Chlorine and Nitric Peroxide fumes.—T. Aitchison, B.M.J. ii./15,489.

Liquor Sodæ Chlorinatæ (*Off.*). 2·5% Cl. *Dose.*—10 to 20 minims. Dissolve Sodium Carbonate 600 in Water 1,000. Triturate Chlorinated Lime 400, with Water 3,000. Mix, and filter.

Should be freshly made. Other Pharmacopœias use more Sodium Carbonate to obtain a preparation which will keep better.

The reaction may be represented as follows:—

$$[Ca(ClO)_2 + CaCl_2] + 2Na_2CO_3 = 2NaClO + 2NaCl + 2CaCO_3.$$

The quantity of Sodium Carbonate in *Off.* method is not enough to precipitate all the dissolved Calcium Hydroxide and if sufficiency is used the preparation is excessively alkaline. R. C. Cowley modifies the formula.—C.D. 1919, 91, 49, abst. Y.B.P. 1919, 230.

Uses.—As a wound lotion and for general antiseptic purposes; for infected wounds or ulcers. It is usually employed diluted with 15 to 60 times its volume of water or normal saline. Thus diluted it has been used as a vaginal douche and as an irrigant of the bladder and mouth wash. Locally in skin affections, however, according to the U.S.D. a 10 to 30% dilution is suitable.

It is strongly alkaline and may well be treated with Boric Acid. (*cf.* Dakin's Solution.)

EAU DE LABARRAQUE or LIQUEUR DE LABARRAQUE.

As made according to the French Codex, this is about ¼ the strength of Liquor Sodæ Chlorinatæ (*Off.*). Much confusion has arisen over this Labarraque's Solution from several aspects. The United States Pharmacopœia IX., for example, gives Eau de Labarraque as a synonym for Liquor Sodæ Chlorinatæ—the strong preparation containing 2·5% available Chlorine.

Initially Labarraque made his bleaching solution by passing Chlorine into Sodium Carbonate Solution. In this case free Hypochlorous Acid is present:

$$Na_2CO_3 + 4Cl + H_2O = 2HClO + 2NaCl + CO_2.$$

Eau de Javelle (first made in 1789) was originally a solution of Chlorinated Potash made with Potassium Carbonate on the same lines as Chlorinated Soda Solution, but it is now replaced in great measure by the Soda Compound. For some historical notes on the matter *vide* H. D. Dakin.—B.M.J. ii./15,809.

Liquor Potassii et Sodii Hypochloritum (Becker). Potassium Hydroxide 5, Sodium Hydroxide 4, Water to 1,000. Dissolve and pass Chlorine *q.s.* into the solution to saturate.

Inoperable cancer has been treated by injections of 1½ to 2 Cc. under the skin daily for varying periods over deltoid muscle, or over the great trochanter, avoiding the growth and neighbouring skin. Platinum needle is used.

It has been found preferable to make this *half strength.* **Sterules** 3 Cc. of this strength are made.

For carbuncles Liquor Sodæ Chlorinatæ, diluted 1 in 20 or 1 in 30, is a non-irritant and powerful dressing.—S. Phillips, L. i./21,63.

Liquor Acidi Hypochlorosi Compositus. *Syn.* **Eusol.**—(Lorrain Smith, Drennan, Rettie & Campbell.—B.M.J. ii./15,129).

This solution contains approximately 0·27% Hypochlorous Acid, together with small amounts of Calcium Biborate and Calcium Chloride. It was at first stated to contain 0·54% Hypochlorous Acid, but this was erroneous and was corrected by the authors of the original communication.—B.M.J. i./16,740; L. i./16,1058.

The solution is slightly alkaline to test paper.

Manufacture.—Take Bleaching Powder 12·5 (of recent preparation and which has not been allowed to get wet), and Tap Water 1,000. Triturate thoroughly with enough of the water to make a paste and dilute with the remainder. Add Powdered Boric Acid 12·5 and shake well. Allow to stand for two or three hours and filter through cloth or paper. Or 25 Gm. of Eupad may be used instead of the two ingredients. The interaction according to the originators may be represented by the following:—

$$2CaOCl_2 + 2H_3BO_3 = 2HClO + CaB_2O_4 + CaCl_2 + 2H_2O.$$

It is to be noted that only *half* the 'available' chlorine (as determined in an assay) is liberated as Hypochlorous Acid, the available Chlorine from $2CaOCl_2$ being 4Cl.

The two powders may conveniently be packed separately ready weighed for use sufficient to make 1 or 2 or 5 litres, for purposes of transit—the chlorinated lime in waxed paper (*cf.* L. i./16,32).

For *Details of Preservation, Assay and Bactericidal Power, see Vol. II.*

Uses.—Although solutions of Alkaline Hypochlorites have been used for many years, solutions of the acid have not been generally employed. Chlorine water probably owes its antiseptic power to the presence of this acid. Lister found the Liquor Chlori of the old B.P. effective when a 1 in 5 solution of Phenol had failed (1870).

Eusol has been most extensively used to wounds. It is the outcome of an investigation at the Royal Infirmary, Edinburgh, to prepare an antiseptic which could be applied as a first dressing in the field to prevent sepsis. It has no harmful effect upon the tissues, the effect being purely local. Flow of lymph is induced by it from the tissues. Its most marked property is the removal of offensive odor in the wound. For field use the practical advantages are that the antiseptic may be used as such or in the form of dry powder (Eupad) if water is not available—*vide* Eupad.

The authors of the original communication state that the solution was used in the customary out-patient cases—injuries to the head or hands, lacerated, contused or incised, many being septic. It was employed as a lotion, a 'soak' covered with waterproof or as a dry dressing (gauze wrung out of the solution and then applied with the usual wool or bandage covering). Septic cases were clean in 1 to 3 days, while Boric Acid soaks conducted as control required 4 to 6 days.

In clean injuries it had about the same effect as Iodine, but produced less smarting.

In mastoid operations and in cases of cerebellar abscesses the use of the solution was most encouraging, also as a douche in maternity cases and in cystitis, for treatment of ulcers of the leg, gangrene of the feet, pyorrhœa alveolaris and follicular tonsillitis. There is no danger of absorption. There was no indication of deleterious effect even on devitalised tissue. In a wound superficial bleaching may occur and with some irritation. If pain is produced, it is a sign that the application is too strong, and it is to be diluted with normal saline. All the above notes refer to the undiluted preparation.

The solution combines a hypertonising effect with its antiseptic action. Whether salt may be added to increase its hypertonicity and to improve its effect is a matter for further investigation. It has to be frequently renewed.

In general, Eusol may be employed as (*a*) a lotion ; (*b*) a fomentation with waterproof cover ; (*c*) on gauze wrung out and applied without waterproof ; or (*d*) as a bath full strength or diluted. The object is to secure the maximum effect with minimum irritation. As a lotion it should in preference be applied *warm*, for example by standing the bottle in a basin of hot water.

The solution is, of course, inexpensive as to its ingredients, the principal cost being the time and skill required.

Tested by the **Edmunds' Cell** method, Sir W. Watson Cheyne found that Eusol did not effect any marked inhibitory action by diffusion. Eupad, however, diffuses widely in agar plates. It is possible it would be a useful agent in delaying infection in the first instance.—L. ii./15,672.

Recent wounds, before suppuration has occurred, specially well treated. It greatly displaced all other forms of treatment in many of the Casualty Clearing Stations. It prevented the occurrence of gangrene in many bad lacerated wounds, and arrested its progress in others. The solution is better than the powder ; the latter is liable to form hard lumps which obstruct free drainage.—Sir A. Bowlby, L. ii./15,1397.

Its effect is sometimes magical. Eusol is seldom painful, and a good routine application, but some skins are very susceptible to it. *It must not be applied for long periods to wounds of the back of the hand, dorsum of foot and of the neck, forearm and wrist.* In general it should be applied once or exceptionally twice daily and *should not be covered by protective.* It should be freshly made. The drip method is specially useful in compound fractures, and in all lacerated wounds of the limbs where there is gas gangrene and foul smelling sores. It need not be continued after the wound is fairly clean and free from smell. A sterile dressing is then sufficient.—A. Don, B.M.J. i./16,648.

Varicose ulcer, carcinoma of rectum (operation), lacerated wounds (results of accidents), severe burns, cystitis (1 in 8 irrigation), tuberculous periostitis with abscess and ulceration, tuberculous arthritis of knee (sinus), hydatid cyst (douche with 2 pints half strength), septic cellulitis, tuberculous osteomyelitis, necrosis of lower jaw for

months, tuberculous hip joint (amputation through joint), acute uppurative appendicitis (syringe and soak half strength), acute treptococcic infection of thumb, epithelioma of neck, tuberculous mpyema, gonorrhœal discharge (burning pain at first on injection—in 5—but decreased as discharge lessened and finally stopped in days), tuberculous otitis media, tonsillectomy (sprayed)—are mongst the 99 civil cases reported by the Medical Research Committee in which Eusol and Eupad were successfully used.

Bullet and shell wounds, compound fractures, the wounds being ll septic on reaching the hospitals comprise the 58 military cases n which there was in general "rapid healing."—L. i./16,300,356.

Intravenous Use of Eusol.

Professor Lorrain Smith and those associated with him determined hat Eusol undiluted could be injected intravenously into rabbits n amounts up to 25 Cc. without any ill effect. As much as 45 Cc. n one case were given, *i.e.* an amount equal to ¼ or ½ the total blood volume.

The injection of amounts of 50 to 100 Cc. has been practised in man in grave toxæmic conditions.

Puerperal septicæmia treated with 100 Cc. repeated after 24 hours without untoward effect. The Hypochlorous Acid probably destroys toxin circulating in the blood. There was no evidence that the Eusol acted as a bactericide.—Lorrain Smith, Ritchie & Rettie.—B.M.J. i./15,716.

Malignant endocarditis with pneumonia treated by 80 to 120 Cc., without harm—*ibid.* Malaria treated—L. i./20,1095.

Liquor Calcis Chlorinatæ (a 10% solution) may also be used to make **Eusol.** Dilute 135 Cc. of the B.P. Liquor to 1 litre, add Boric Acid 10 Gm., and shake to dissolve. The Boric Acid may be kept in saturated solution (4%). 250 Cc. will be required to make the litre of Eusol. Dilute the Liquor Calcis Chlorinatæ to 750 Cc. and add the 250 Cc. Boric Acid solution. Liquor Calcis Chlorinatæ keeps well. These quantities are based on a chlorinated lime assaying 25% available chlorine, which is about an average. If Bleaching Powder of high quality is used, 125 Cc. of the solution will be sufficient.

For Intravenous Injection in septicæmia, dilute the 135 Cc. of Chlorinated Lime Solution to 500 Cc., add the Boric Acid Solution, and finally Sodium Chloride 8·5 Gm. in Water 250 Cc.—Prof. Lorrain Smith and co-workers, B.M.J. ii./17,386.

Acute toxæmia secondary to gas gangrene treated by Hypochlorous Acid solution (Eusol to which 0·85% Sodium Chloride was added) intravenously. 40 Cc. to 70 Cc. doses by means of a Record syringe into the median basilic vein. In one case 70 Cc. Recoveries in three cases very gratifying.—J. Fraser and H. J. Bates, B.M.J. i./16,83.

Further cases with excellent recoveries. 25 to 70 Cc. doses. The effects of toxins produced by gas gangrene organisms can be neutralised by hypochlorous acid in this manner.—J. Fraser and H. J. Bates, B.M.J. ii./16,173.

Its feeble alkalinity (due to calcium biborate) renders it safe for introducing into wounds and serous cavities. In lacerated and contused wounds it is the most efficient antiseptic we possess. A solution of pure hypochlorous acid (*i.e.*, without the calcium biborate) cannot be injected intravenously as it coagulates the blood, nor can a dilute Sodium Hypochlorite solution, as it causes hæmolysis. The rate of injection (10 Cc. per minute) is an important point.—B.M.J. i./16,171,175.

A two-way canula fitted with a stopcock is useful—attached to the 20 Cc. Record syringe. Saline from the syringe is first injected, then the Eusol

(warmed to body temperature) is drawn up from a flask. As much as 150 Cc. may be given. Care must be taken not to inject Eusol into the tissues, as even a few drops causes severe pain.—J. A. Graham, B.M.J. i./16,632.

H. D. Dakin states that as a dose of 100 Cc. (containing 0·27 Gm. HClO) on injection becomes at once diluted with 4 or 5 litres of blood, assuming no decomposition occurs, the resulting strength is not more than 50 to 65 mgr. HClO per litre, and even if this concentration persisted, it is much below the strength at which direct action is observed, for example on *B. Coli* or *Staphylococci* suspended in blood or even in serum. Direct germicidal effects cannot be ascribed in these circumstances.—B.M.J. i./16,852.

The action, it is thought, depends on formation of Chloramines *q.v.*

Septic endocarditis treated by injection of 40 Cc. preceded by 300 Cc. of Normal Saline. The case was a girl of 13—apparently moribund at the time of injection. Recovery.—J. Allman Powell, B.M.J. ii./16,422.

Generalised sepsis. Two cases of septic otitic thrombosis of the signoid sinus. 60 Cc. intravenously with the same quantity of lukewarm saline. Successful.—J. S. Fraser and A. Campbell, B.M.J. i./17,357.

Modifications of Eusol.

Cordova's Modified Eusol. To normal Saline 800 Cc. add Chlorinated Lime and Boric Acid of each 10 Gm. Shake and allow to stand for two to three hours, filter and add Calcium Chloride 2 Gm. This solution must not be kept longer than three days.

Intravenously 20 Cc. doses in a rabbit were generally well tolerated. 10 Cc. entirely harmless. 10 Cc. doses of the solution protected the animal against diphtheria toxin and against *repeated doses* of Tetanus and against *Staphylococcus Aureus* and *Bacillus Perfringens*. This destruction of toxins is probably of the nature of a protein coagulation.—R. F. Cordova, B.M.J. ii./15,504; i./16,651.

It was suggested (L i./16,32) that a mixture of Sodium Bicarbonate and Chlorinated Lime might be substituted—the carbon dioxide of the bicarbonate to liberate the HClO, but a mixture of this kind could not be used intravenously, as it coagulates the blood—which Eusol does not. Chemically Boric Acid acts to some extent as a stabiliser, while a Chlorinated Lime and Sodium Bicarbonate mixture after 7 days at 40° has lost almost its entire original "available" chlorine.—R. Glode Guyer, L. i./16,253,265.

Electrically made Hypochlorous solution as a disinfectant. Does not coagulate albuminous matter. It is non-irritating. Found better than ordinary Hypochlorite Solutions. Requires special apparatus which can be made at comparatively small cost. Successful in throat work, scarlet fever and eczema.—F. C. Lewis and G. W. Gee, B.M.J. i./17,256.

(Chas. Watt discovered an electrolytic process in 1859, since when there have been "scores" of electrolytic processes advanced.—B.M.J. ii./15,809.)

Eupad. **Pulvis Calcis Chlorinatæ et Acidi Borici.**

(Lorrain Smith and co-workers, B.M.J. ii./15,129.)

Mix intimately equal weights of finely ground Bleaching Powder (dry) and powdered Boric Acid.

Preservation.—Should be kept in closely stoppered bottles and not exposed to the light more than necessary—indeed, it would be preferable to mix it quite freshly for use, as there is much loss of Hypochlorous Acid on keeping, owing to the inherent moisture always present in Chlorinated Lime.

Caution. The evolution of Chlorinated vapour in mixing the ingredients is quite sufficient to "gas" the unwary.

Strength.—Employing Bleaching Powder of the *Off.* strength, this preparation contains 15% available Chlorine or 11% approx. of Hypochlorous Acid.

Uses.—This antiseptic dressing was advocated as a dry dressing to wounds during the war. It evolves Hypochlorous Acid.

The gas evolved acts more energetically than that contained in Eusol, and it is liberated more rapidly when moistened between layers of gauze or lint (as in the pad of a first field dressing), and covered with wool and a bandage.

When applied as above but covered with waterproof it should be used for a short time only—10 to 15 minutes as a rule. If it causes pain a weaker application is indicated. The irritation, however, generally affects the skin surrounding a wound.

It can also be employed on strands of gauze or wool by a process of drainage or as a dusting powder—for example on septic sores.

A large boil on the leg—amongst cases cited—was opened and a drain of gauze powdered with Eupad inserted. On the second day the wound was dry and no pus could be expressed. The drain was repeated for another day and afterwards dry sterile gauze applied. Completely healed by the ninth day.

1 to 2 Gm. is the quantity mentioned as suitable for use in the first field dressing.

Pulvis Calcis Chlorinatæ et Acidi Borici Mitis. *Syn.* "**Kepad.**" —*Martindale.*

Manufacture.—Chlorinated Lime 1, Boric Acid in fine powder 9½, Kieselguhr (sterilised thoroughly) 9½ (*i.e.*, 5% Chlorinated Lime).

Eupad was found to be irritating. This preparation ($\frac{1}{10}$ its strength) is suggested as a dusting powder on septic sores.

Preservation.—The Powder should be kept in stoppered bottles. The sterile Kieselguhr and Boric Acid may be kept ready mixed and the Chlorinated Lime added when required. Kepad containing stronger proportions of Chlorinated Lime may be prescribed, *e.g.* 10, 20, 30%, etc. Smaller proportions—1, 2%, etc.—of Chlorinated Lime may also be ordered—the ratio of Boric Acid and Kieselguhr being kept always the same, *viz.*, equal amounts. Kieselguhr commends itself as diluent on account of its light physical character and absorbent properties.—B.M.J. ii./16,147.

Dakin's (Stronger) Hypochlorite Solution.

The following method we find best in making large quantities :— Rub Chlorinated Lime 150, into a smooth paste with 100 of water and add gradually with stirring Sodium Carbonate (Cryst. + $10H_2O$) 285, previously dissolved in water 900.

Allow to deposit, filter and titrate 20 Cc. of the filtrate with Boric Acid solution (31 Gm. per litre) using phenolphthalein suspended in water as indicator to ascertain the amount of boric acid to be added to the bulk. An excess is to be avoided ; it is best to add slightly *less* than the calculated amount. Alcoholic solution of phenolphthalein cannot be used as the alcohol is at once attacked.

Strength.—This concentrated solution contains about 4 per cent. of sodium hypochlorite and is ***to be diluted with 6 parts of water for use.*** It can be kept for a month without serious decomposition.

The titration must be done fairly rapidly. The amount of Boric Acid to be added generally about 2% of the volume.

The principle of the preparation depends on the fact that certain fluids, such as blood and certain artificial salt solutions containing a mixture of salts of polybasic acids—*e.g.*, phosphoric acid—retain their essential neutrality even after the addition of limited quantities of acid and alkali, which merely changes the relative proportion of two or more salts of the polybasic acid in the solution. The use of the feebly polybasic boric acid makes a solution containing a balanced mixture of hypochlorite and polyborates of sodium with small amounts of free hypochlorous and boric acids. The irritating action of free alkali is thus avoided. The boric acid is not used for its slight antiseptic action, nor is it used to liberate hypochlorous acid. The solution maintains approximate neutrality under all conditions.

Dakin's (Weaker) Hypochlorite Solution.

Rub Chlorinated Lime (of good quality) 200 Gm. to a smooth paste with a little water and dilute with water *q.s.* to 5 litres. Dissolve Sodium Carbonate (Cryst. + $10H_2O$) 400 Gm. in a further quantity of 5 litres of water and add to the Chlorinated Lime suspension with thorough stirring or shaking.

After ½ hour the clear liquid is syphoned off and filtered through cotton wool. Boric Acid 40 Gm. is added to the clear filtrate (not before filtering). The solution should not be kept longer than 1 week.

For a comparison of strengths of Dakin's Solutions with Liquor Sodæ Chlorinatæ (Off.) as also Bactericidal Power, see Vol. II.

Uses.—As a non-irritating antiseptic for treatment of wounds. The treatment should be started early and fresh quantities of the solution should be brought in contact with all parts of the wound as frequently as possible for a considerable period of time. The solution assists in the rapid dissolution of necrosed tissue, this being doubtless due to the ability of hypochlorites to attack the NH groups present in proteins forming soluble chloramines. Compounds of the Chloramine type are formed *in situ* when wounds are treated with hypochlorous acid, and this is an advantage, as a certain antiseptic action may be expected to persist even after the free hypochlorite has disappeared—*cf.* Chloramine-'T.'

Liquor Sodæ Chlorinatæ (*Off.*). Owing to hydrolysis, gives rise to alkalinity, which increases with dilution :

$$NaClO + H_2O = NaOH + HClO$$

hence the Boric Acid was added with a view to neutralising the caustic action of such solutions. The caustic alkali, as formed, is neutralised by the Boric Acid or acid borates present.

The solution was first advocated for use by *Carrel's Method* (B.M.J. ii./15,318)—introduction into wounds by rubber tubes.

The rubber tubes are closed at the end and in the sides there are numerous small openings about a centimetre apart. Pieces of gauze are placed lightly round and between the tubes and the solution runs into the wound and irrigates it.

When applied for continued irrigation vaseline may be smeared on the adjacent skin to prevent irritation. Cicatrisation is not delayed even by continuous use.

N.B.—Not to be injected intravenously.

The best results in the first six months trial at the front were in ambulance cases where the treatment could be begun early.

Results uniformly good on the wounded (57 cases) treated on board the *Rewa*. Rubber tubes inserted and slips of gauze arranged round and lightly packed into every part of the wound—the gauze slips act as wicks. In badly septic cases the hypochlorite may be injected into the tubes (Carrel's method) every 2 or 3 hours for 24 or 48 hours.—F. J. A. Dalton, B.M.J. i./16,126.

Sloughing and dead and decomposed material quickly disappear. There must be no impermeable material outside the gauze. Care needed in locating the tubes, regulating the instillation, and in some cases ensuring that the patient's bed and clothing do not become soaked.—Sir G. H. Makin's Hunterian Oration, B.M.J. i./17,216; L. i./17,252. See also Sir B. Moynihan, B.M.J. i./16,336; B.M.J. i./17,597; i./18,170.

Empyema treated.—R. A. Stoney, B.M.J. i./18,198.

Daufresne's Modified Dakin's Solution.

Chlorinated Lime 200 Gm. is shaken vigorously with 5 litres of water and left in contact for 6 to 12 hours. Sodium Carbonate (Dry) 100 Gm. and Sodium Bicarbonate 80 Gm. are dissolved in a further 5 litres. This solution is poured into the Chlorinated Lime Solution, the mixture well shaken and filtered.

The solution should contain between 0·45% and 0·5% Sodium Hypochlorite. Its use is particularly satisfactory if employed in the first 24 hours after the infliction of the wound. 75% of the deaths from wounds in war, it was stated, after the first 24 hours, were due to sepsis.—Sherman on Carrel's Sterilisation method.—L. ii./16,800.

Magnesium Hypochlorite is well tolerated by the tissues. Less caustic than the sodium compound. It has less antiseptic power, but twice as much can be used.

To prepare, mix Magnesium Sulphate 190 Gm. in 2 litres of water and interact with Chlorinated Lime 100 Gm. dissolved in the same amount of water and filter out the Calcium Sulphate.—B.M.J.E. i./16,16.

✱ **"Milton" Disinfectant** (T.M. 375959, Class 2, 381,513, Class 2 assoctd. and 382491, Class 3, assoctd. and 409535, Class 3.). This antiseptic contains Sodium Hypochlorite with a high percentage of hypochlorous acid.

It is stated to be made by electrolysing Sodium Chloride resulting in the production of a stable form of Hypochlorite with only Sodium as a base. Available Chlorine is 1·05%. Analyses of samples kept for periods of a couple of years have substantiated its keeping powers. A deodoriser, preservative, insecticide and general antiseptic. It is stated to be harmless to the human system either internally or externally.

It is used for wounds and skin affections, either full strength or diluted down to 1 in 70. For abscesses, fistulas, etc., it can be used undiluted. For the vagina and cervix 1 in 4.

For packing the vagina, gauze soaked in a 1 in 10 to 1 in 30 dilution. The pack changed every 12 hours for several days prior to operation.—W. Blair Bell, L. i./20,997.

In gonorrhœa of the female, prior to childbirth, a tablespoonful to the

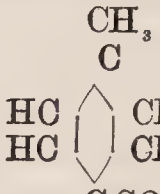
pint, as a vaginal douche, and half-tablespoonful to the pint for bladder and urethral irrigations in cases of urethritis.—C. W. Rundle, L. i./20,1268.

Pueperal sepsis. Advised, in cases where it is known at the time of labour that the uterine cavity has probably been infected by intrauterine manipulating.—Victor Bonney, B.M.J. i./20,266. Employ a 1 in 10 dilution for the first irrigation and later 1 in 30.—W. Blair Bell, B.M.J. i./21,695.

Has been found useful for syringing out antrum suppuration and for pyorrhœa and other suppuration in the mouth.

Chloramine-'T.'

Syn. CHLORAZENE, or *p*.-TOLUENE SODIUM SULPHO-CHLORAMIDE.



$= 281{\cdot}667.$

$C.SO_2 Na NCl + 3H_2O.$

('T' indicates relationship to Toluene, Chloramine being the name given to some Pastilles.)

The substance is also issued under the name ✱Tolamine (T.M. 371601). Care should be taken to prevent confusion with *Chloramide* —an unnecessary, to our mind, contraction for Chloralamide.

It was originally made and studied by Chattaway.—Trans. Chem. Soc. 87, p. 153 (1905).

Dose.—½ to 3 grains (**0·03 to 0·2 Gm.**) has been given diluted with charcoal.

Manufacture.—*p*-Toluene Sulphonamide is made by acting on *p*-Toluene Sulphone Chloride (a by-product in making Saccharin) with Ammonium Carbonate.

Chattaway treated the amide with bleaching powder and acetic acid and converted it into *p*-Toluene sulpho-dichloramide and this by the action of Sodium Hydroxide was converted into *p*-Toluene-Sodium-sulphochloramide. It is more economical to dissolve the sulphonamide (1 mol.) in 5% cold alkaline solution of Sodium Hypochlorite (1·2 mol.), warm gently if necessary, filter and add 1½ volumes of saturated brine. Chloramine-'T' crystallises out, is filtered off, washed with brine and dried in the air.

For the theory appertaining to use of Chloramine 'T' and its Bactericidal Power, see Vol. II.

Solubility.—A saturated solution contains about 1 in 7 at room temperature. It is soluble 1 in 2 of boiling water, 1 in 7 of glycerin, 1 in 12 of alcohol—by our experiments, but caution should be exercised with solutions in organic solvents—for example we found that on keeping, the Glycerin solution crystallised, gelatinised to some extent, and there was a certain amount of gas evolution. The aqueous solution is faintly alkaline and has a bitter taste. It is insoluble in Liquid Paraffin.

Incompatible.—Alcohol and Hydrogen Peroxide and many other substances. Should not be mixed with other antiseptics.

Uses.—For treatment of infected wounds and as a general surgical antiseptic, mouthwash, vaginal douche and for urethral irrigation. It is non-irritant and practically non-toxic; does not coagulate blood serum. Not suitable for intravenous use—has marked hæmolytic action.

In intestinal affections ½ to 3 grain doses combined with Charcoal 5 to 10 grains in cachet.—Pres., Feb., '20, p. 83. The charcoal would hardly 'protect' the Chloramine from the action of gastric juice as is suggested.—W. H. M.

Strength for Use—2 to 4%. The former is used for injecting into infected wounds and for general use—increased if required. Mouth-wash, nasal or vaginal douche or for urethral irrigation, 0·25 to 2%.

To *sterilise water* 1 in 250,000 of Chloramine-'T' is effective if a little Citric Acid (0·8 Gm. per litre) be added—the resulting water is not unpleasant to taste.—B.M.J. i./17,682. *cf.* Halazone.

In aqueous solution it is fatal in 10 minutes to the following organisms at the stated dilutions: *Streptococci*, 1 : 34,000; *B. Coli* 1 : 18,000; *B. Diphtheriæ*, 1 : 30,000; *Pneumococcus*, 1 : 22,000; *B. Dysenteriæ*, 1 : 22,000; *B. Typhosus*, 1 : 20,000; *Staphylococci*, 1 : 16,000.

CHLORAMINE-'T' PREPARATIONS.

Tablets 8·75 grains. Two in 2 ounces of water = 2%. Tablets 43·75 grains. One in ten ounces water = 1%. Two tablets = 2%.

Chloramine-'T' Gauze, 5 and 35% strength is made.—The former for general use; the latter as preliminary dressing of a wound.

Use *dry* and subsequently moisten if necessary when in position. Even 4% gauze, experience shows, has higher antiseptic value than any other gauze on the market.—Medical Research Committee, B.M.J. ii./16,766. For *some further aspects*, see B.M.J. i./16,454,455.

Highly spoken of for checking development of infective processes. Will effect a growth of new, healthy granulation tissue in a remarkable way.—Sir B. Moynihan.—B.M.J. i./16,335.

Chloramine-(T) Oily Suspension.

Experimental.—During the war (November, 1917) we had occasion to make experiments to produce a solution of Chloramine-'T' in Liquid Paraffin. It is practically impossible but a **Suspension** of one or more per cent. of Chloramine-'T' or p-*Toluene sulphochloramide* (which is easily made by treating a saturated solution of Chloramine-'T' with Hydrochloric Acid) in very fine powder in Liquid Paraffin, or preferably in a mixture of Liquid Paraffin and White Soft Paraffin, may be useful therapeutically.

Chloramine-'T' Ointment—Chloramine-'T' 10, Sodium Stearate 86, Water 4. As a dressing to a wound after it has become superficial and is healthily granulating. The content may be increased to 12% or reduced to 6%.—B.M.J. ii./17,597. A 1% *Cream* is usually employed.

References.

Mouth and jaw wounds treated with 2% solution. Non-irritant. Results in seven cases good.—A. R. Fisher, B.M.J. i./16,87.

Value of Chloramine-'T' and the hypochlorites appears to rest to a great extent on their action as solvents of necrotic tissue and power of destroying toxic substances since their bactericidal power in presence of serum is comparatively weak (*cf.* Flavine) and at

the same time they greatly interfere with phagocytosis.—C. H. Browning and Colleagues, B.M.J. i./17.76.

Chloramines are powerful irritants. A thorough experimental study of effects of Chloramine-T on animals.—B. Fanlus & M. I. Smith, Jl. Pharm. and Exp. Therap., Nov., 1919.

Di-Chloramine - 'T.' *Syn.* **Toluene-Sulphodichloramide.**

$CH_3C_6H_4.SO_2.NCl_2 = 239{\cdot}079$.

This substance enables an oily solution to be prepared, the corresponding monochloride being insoluble in oils. (*cf.* our experiments *antea.*)

Manufacture.—Chattaway (J.C.S.T. 1905, Vol. lxxxvii. p. 145) prepared it on the following lines :—

Shake thoroughly Chlorinated Lime 350 to 400 Gm. in water 2 litres for one hour and allow to deposit. Syphon off the clear liquor and filter off the remainder. Add Toluene-*p*-sulphonamide 75 Gm. to the liquor and shake to dissolve. Filter if necessary. Acidify in a separator with Acetic Acid 100 Cc. added in portions and extract the Dichloramine with Chloroform about 100 Cc. Dry the Chloroform layer after removal with Calcium Chloride and allow to evaporate in the air. Recrystallise if necessary.

Alternative Method.—Pass Chlorine in sufficient quantity to saturate into a mixture (which is kept cool) of Toluene-*p*-sulphonamide 50 Gm., Water 500 Cc., Sodium Acetate (cryst.) 100 Gm., and Chloroform 100 Cc.—more chloroform being added if necessary to dissolve. Remove the Chloroform layer and proceed as above.

Solubility—It can only be used in oily solution, being insoluble in water.

Chlorinated Eucalyptol.

Treat Eucalyptol 100 Cc. with Potassium Chlorate 3 Gm. and Hydrochloric Acid (conc.) 10 Cc. for 12 hours or longer. Then wash with water and with Sodium Carbonate solution. Remove the water, add Sodium Carbonate 3 Gm., and allow to stand 24 hours. Filter and dry with a little Calcium Chloride.

Chlorinated Paraffin.

Employ Liquid Paraffin 100 Cc. with Potassium Chlorate and Hydrochloric Acid as above, exposing the mixture to the light, preferably sunlight, several hours. Wash with water, then Sodium Carbonate, then water again. Remove the oil, add a little Calcium Chloride and about 1 Gm. of Animal Charcoal. Shake and filter.

Solution of Dichloramine-'T' in Chlorinated Eucalyptol-Paraffin.

Dissolve Dichloramine - 'T' 2, in Chlorinated Eucalyptol 20 without heating, and add Chlorinated Paraffin 80.

The solution is relatively unstable and not to be used when a distinct precipitate appears.—E. K. Dunham and H. D. Dakin, Med. Res. Com., B.M.J. i./17,265,865.

Russian Oils, containing much Naphthenes, are not so suitable as American (Pennsylvanian) Oils, which contain considerable quantities of Olefines as well. *cf.* Paraffinum Liquidum.

Uses.—This solution has been suggested for disinfection of the naso-pharynx in the treatment of meningococcus carriers and the carriers of other disease organisms.

Dichloramine - 'T' in Eucalyptol – Paraffin solution applied to wounds by spray and covered with gauze. Dress again every 24 hours. Very little of it is required. It saves pain, as it is easily removed. Eliminates the Carrel tube.—J. E. Sweet, B.M.J. ii./17, 249. See also J. T. Morrison and co-workers, L. ii./18,230.

This Eucalyptol and Liquid Paraffin method is now superseded by the use of Paraffin Wax :—

Chlorcosane. A chlorinated paraffin wax in the form of a light yellow oil slightly heavier than water. Employed chiefly as solvent of Dichloramine - 'T.'

Manufacture.—Hard Paraffin of melting point 50° C. or higher is heated to about 120° C. and chlorinated. The temperature while the gas is being quickly passed into it should be kept within 125—140° C. Continue until the paraffin has increased in weight 45 or 55%. Hydrochloric Acid is evolved. The oil while still warm is then shaken vigorously with 5% of its weight of dry sodium carbonate and filtered.

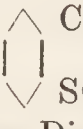
The liquid is now ready for use—it is described as of light yellow colour, with a viscosity between that of Olive Oil and Castor Oil, without odour and bland in use as a nasal spray or when placed on wounds.

To prepare a solution of Dichloramine - 'T' (of which it will dissolve 8·5 to 10%, 7·5 to 8% is strong enough), a portion of the oil, *e.g.*, a quarter, is heated to 75 or 80° C. and the Dichloramine - 'T' added. It dissolves. Then add remainder of the Chlorcosane. This solution is employed for nasal irrigation and for wounds.

Carbon Tetrachloride 10% may be added to make the solution more fluid for spraying.—H. D. Dakin and E. K. Dunham, B.M.J. i./18,51.

***p*-Sulphondichloramino-benzoic Acid.** $Cl_2NO_2SC_6H_4.COOH$ = 270·063. **Halazone.**

To sterilise ordinarily contaminated water in 30 minutes, 1 in 300,000 is sufficient.

Manufacture.—*p*-Sulphon-amino-benzoic Acid  = 169·161, is first made. Add Commercial Sodium Dichromate 250 Gm. to a mixture of Sulphuric Acid (conc.) 200 Cc., and Water 600 Cc. Then add crude Toluene *p*-Sulphonamide 100 Gm. (readily made from *p*-Toluene Sulphone Chloride, a waste product), and heat with reflux condenser 1 hour. The reaction at first is vigorous. On cooling, wash the separated crystals well with cold water and dissolve in dilute Sodium Hydroxide solution in slight excess. Filter hot, add excess of Hydrochloric Acid and when cold filter off the precipitated acid and wash well with water and dry. Yield is about 80% of theory.—Remsen. Ann. 178, p. 298 (1875).

Now dissolve 20 Gm. of the *p*-Sulphonaminobenzoic Acid in 200 Cc. approximately Normal Sodium Hydroxide Solution (2 molecules), warming if necessary. Add about 200 Gm. crushed ice and saturate with a rapid current of Chlorine. Shake while the gas is being introduced, adding more ice if temperature rises. The Sulphondichloramino Acid precipitates at once. Filter off, wash with cold water and dry *in vacuo* on a porous plate. Powder and preserve in bottles. Yield is practically theoretical.

Soluble sparingly in water, insoluble in chloroform and petroleum. Soluble also in excess of cold Sodium Hydroxide solution, but with less quantity or with feebly alkaline salts, *e.g.*, phosphates or borates, hydrolysis occurs.

Assay.—0·1 Gm. is dissolved in glacial acetic acid and Potassium Iodide added. Titrate with N/10 Sodium Thiosulphate of which 14·8 to 14·9 Cc. will be required.

Tablets.—To prepare, powder the Sulphondichloramino-acid 4, with dry Sodium Chloride 92 and add dried Sodium Carbonate 4 (or dried Borax 8%). Pass through a No. 40 sieve (no lubricant required or indeed is to be used), and compress into tablets weighing 100 mgr.

Each tablet so made contains 4 mgr. of the Disinfectant—sufficient for a litre or a quart of reasonably heavily contaminated water. —H. D. Dakin and E. K. Dunham.—B.M.J. i./17,682.

ACIDUM IODICUM.

HIO_3=175·928. *Dose.*—1 to 5 grains (**0·06 to 0·3 Gm.**).

White crystalline powder very soluble in water. Iodic acid is a remarkable deodorant and preservative even in a 1 in 2,500 solution, It is employed in ozæna, for deodorising offensive urine, as an irrigant in empyema (strength 1 in 500) and for leg ulcers, as a mouth wash, *e.g.*, in inoperable epithelioma, and as a throat swabbing in diphtheria. Found useful in extensive burning (1 in 500 solution). Internally a drachm of a 1 in 100 solution, well diluted, has been given in gastro-intestinal sepsis, as in typhoid fever. The calcium salt is principally employed.

Calcii Iodas. $Ca(IO_3)_2, 6H_2O$=498·006. *Syn.* CALCINOL.

Dose.—3 to 4 grains (**0·2 to 0·25 Gm.**), three times daily in solution.

Tasteless, odourless powder, soluble in 380 parts of water at 11·5° C. Contains 51% of iodine and 16% of available oxygen. Acts equally well in an acid or alkaline medium as a deodorant and anti-putrefactive.

Uses.—Is particularly useful as a dusting powder. **Lotio Calcii Iodatis** (saturated aqueous solution) is employed in septic and suppurating wounds, and a **Gauze** (3% strength) may be used for the same purpose. Healing ensues with the production of a dry scab. A warm saturated solution is used as a **vaginal douche** or bladder irrigant; efficient as a mouth wash or gargle. Should prove useful in **dentistry**, *e.g.*, in pyorrhœa alveolaris. An **ointment** 10 grains

to the ounce has been found to be a specific in various forms of eczema. A solution or a 10% insufflation with bismuth carbonate may be useful in otorrhœa. May prove of value in fœtid breath.

Hypodermic injections of from ½ to 2 drachms of an emulsion of 3 drachms of the Iodate in 1 ounce of glycerin have been used in tuberculous joints.

Hydrargyri Iodas, $Hg(IO_3)_2 = 550{\cdot}44$.

Dose.—$\frac{1}{6}$ to $\frac{1}{3}$ grain (**0·01 to 0·02 Gm.**).

A white powder, strongly antiseptic. ***Soluble*** with the addition of Sodium Chloride to the extent of 2% in water. Potassium Iodide also assists solubility. It has the scientific advantage of attacking disease organisms with both its component ions, and it contains only half as much Mercury as the Perchloride. In a pronounced sycosis of hairy parts of the face an ointment containing 20 grains to the ounce produced an effectual cure.

Bismuthi Subiodas, a fine white unirritating powder.

Insoluble in water. In lupus as dusting powder and ointment (20 grains to the ounce), and in scrofulous glands as a dusting powder.

Sodii Iodas, $NaIO_3 = 197{\cdot}92$. 1½ grains in 5% solution (about saturated) have been injected for acute and chronic articular rheumatism.

Zinci Iodas.—$Zn(IO_3)_2 = 415{\cdot}21$. White powder.

Soluble about 1 in 50. Use similar to that of calcium iodate.

ACIDUM LACTICUM.

(*Off.*), and numerous Pharmacopœias. $CH_3.CHOH.COOH = 90{\cdot}063$.

Dose.—15 to 30 minims (**1 to 2 Cc.**), well diluted. U.S. *average dose* 30 minims.

A colourless, odourless, syrupy, sour liquid, obtained by the fermentation of milk sugar by the action of *Bacillus acidi lactici*. Lime or Zinc Oxide is used to neutralise the acid as formed. The respective lactates are then decomposed. It has Sp. Gr. 1·21 and contains not less than 75% by weight of hydrogen lactate and not less than 10% by weight of lactide $C_6H_8O_4$. Fr. Cx. has Sp. Gr. 1·24 at 15° C. —is nearly pure.

Solubility.—Is miscible with water, alcohol, and ether; it coagulates milk and albumin.

Uses.—It is employed topically to destroy morbid growths, in diphtheria, &c., and internally for infantile and tropical diarrhœa, for diabetes, dyspepsia, and to allay cough in phthisis, and as a stomachic tonic in combination with iron and lime. Has been used locally in tuberculous ulceration of the pharynx and larynx. As a paint, or paste with kaolin, or as a 50% injection, has been used in lupus, but is painful.

In chronic catarrh of the bladder, lactic acid drinks arrest the ammoniacal decomposition of the urine, both inside as well as outside this organ, dissolve the salts and are said to stop the development of micro-organisms

Chronic enteritis treated with Lactic Acid 7½ minim doses *t.d.s.p.c.*, the rationale being that *B. Coli*, which is, as a rule, universally active in those cases where the motions are unduly offensive, cannot grow in a concentration of Lactic Acid of more than 1%.—I. H. Lloyd-Williams, B.M.J. i./23,1053.

Test for in vomit, &c., *vide* 'Examination of Stomach Contents.' Vol. II.

Butyric Acid—$C_3H_7.COOH$=88·084.—(with the characteristic evolution of hydrogen) may also be produced by the above process if the fermentation proceed too long, or if the lactic acid is not neutralised as it is produced by the presence of calcium carbonate or zinc oxide.

Acidum Lacticum Dilutum (B.P. 1885). Sp. Gr. 1·040. Lactic Acid 3 ounces, Distilled Water *q.s.* to 1 pint. *Dose.*—½ to 2 drachms (2 to 8 Cc.).

In gonorrhœa a few drops of the pure acid have been injected just beneath the membrane of the cervix. It is useful for infantile diarrhœa with green stools.

Laryngeal tuberculosis has been treated by application of (Lake's) mixture of Lactic Acid 50%, Formalin 7%, and Carbolic Acid 10%. May be diluted to ½ strength.

Arguing on the theory that lactic acid may be a natural protective substance when produced, as it is, in the case of cancer of the stomach and that sour milk is a country remedy for it in Russia, the acid has been tried for the complaint externally, a dressing of 0·25 to 1% is applied and internally tablespoon doses of a 1 in 45 solution.

Injectio Acidi Lactici, C.L.T.E.

Lactic Acid 4 to 6 drachms, Water to 1 ounce. To be introduced by means of a submucous laryngeal syringe into the tissues of the larynx.

Nebula Acidi Lactici.

Lactic Acid 1, Distilled Water 15. Of some use in diphtheria; appears to have the effect of dissolving the membranous exudation.

Spiritus Acidi Lactici.

Lactic Acid 3, Castor Oil 2, Lavender Water 4, Alcohol 90% to 24. Suitable for treatment of alopecia areata. To be rubbed in gently at first, later with some friction.

Calcii Lactas, (*Off.*), P. Jap. IV $\left[C_2H_4\begin{Bmatrix}OH\\CO.O\end{Bmatrix}\right]_2 Ca + 5H_2O$=308·26.

Dose.—10 to 30 grains (0·6 to 2 Gm.).

An opaque, white, crystalline powder, antiseptic and stomachic, and given for rickets; soluble in water, 1 in 15 if freshly prepared.

Manufacture.—Pure Calcium Lactate can be made by precipitating the cold saturated Solution with Acetone and then washing first with Acetone and then with Ether. B.P. requires 93% pure.

Flavoring.—It is practically tasteless; if desired to flavor any Glyl or Syl may be prescribed.

Uses.—Urticaria and chilblains have been treated with it. Chilblains are stated by Sir A. E. Wright to be caused by thinness of the blood, which permits of effusion into the tissues and consequent

swelling and inflammation. Is useful to give prior to operation to increase coagulability of the blood, but in a case it was found not suitable *per os*. Further, hypodermically, produced painful coagulation locally and collapse.

According to Dixon must be *injected* to produce the effect.—*cf.* Calcium Chapter.

For chilblains in the adult 15 grain doses dissolved in 1 ounce of Chloroform Water with ½ to 1 minim of Capsicum Tincture, thrice daily one hour before meals, to be continued over six weeks. Constipation which may be expected is to be corrected by Senna Pod Infusion.

Hæmoglobinuria, œdema of the feet, boils, eczema, scurvy, urticaria, erythema, lichen planus, gouty pruritus, pruritus ani, have also been treated with success.

In hæmophilia use of Calcium Lactate or Chloride recommended.

The salt is readily oxidised in the system with result that the basic radical is placed more fully at the disposal of the organism than in the case of the Chloride being administered.—Luff. B.M.J. i./09,261. P.J. i./09,150.

Color blindness treated by Calcium Lactate—the theory being that it stimulates metabolism, hence ought to stimulate retinal cells to respond more to color sensations. A case in which response to green was *nil* was able to detect things of this color after only 10 grains of the salt. Two other cases with larger doses gave equal encouragement.—B.M.J. ii./09,315.

Hæmorrhage, post-partum treated. Six multiparæ, who had suffered more or less from hæmorrhage in previous confinements, treated with 3 Gm. doses *pro die* for some time before delivery. In all the hæmorrhage appeared to be less than normal, but the treatment was not entirely satisfactory. In a girl of 13, however, suffering from metrorrhagia which had refused to yield to Hydrastis or Ergotin, Calcium Lactate arrested the discharge in three days.

In recent epilepsy it has not been proved that the blood coagulates more rapidly in the fit period, but Calcium Lactate alone and combined with Potassium Bromide has been given with satisfactory results. The lime salts appear worthy of further study in treating epilepsy.—L. ii./10,219.—Pres. 1910, 18,214.

In a case of erythema with periodical return drachm doses were most effectual, to our knowledge.

Spasmodic rhinorrhœa—a case of an annual sufferer from hay fever relieved by tapping antrum and washing out, giving Vaccine from the *B. Coli* isolated in pure culture from the pus and full doses of Calcium Lactate.—L. ii./12, 1012.

For further notes on the administration and removal of lime salts from the tissues, vide Calcii Chloridum.

Tablets of Calcium Lactate contain 5 grains each.

Liquor Calcii Lactatis. *Martindale. Dose.*—½ ounce (=15 grains Calcium Lactate). Calcium Carbonate 4, Lactic Acid (75% strength) 8, Water to 180. This, if stored in well corked bottles, has the advantage of keeping satisfactorily.

Mistura Calcii Lactatis Recentis (*Blair Bell*).

Dose.—½ to 2 ounces (15 to 60 Cc.) equivalent to approximately 15 to 60 grains of Calcium Lactate.

Calcium Carbonate 75 grains, pure concentrated Lactic Acid 200 grains, Chloroform Water to 8 ounces. This is similar in strength to the last mentioned.

Normally the amount of ionised Calcium in the blood tends to rise at the end of pregnancy owing to lessened demands of the fœtus and these salts greatly influence the tone of involuntary muscle fibres. Pregnant women should take 2 ounces of the mixture every night with Infundibulin 0·5 Cc. intramuscularly night and morning for a fortnight before parturition is due —W. Blair Bell, B.M.J. ii./21,545.

Ferri Lactas (Ferrous), Fr. Cx., **P.Belg., P. Ital., P. Jap.** $(C_2H_4OH.COO)_2\ Fe+3H_2O=287{\cdot}988$

Dose.—1 to 5 grains (**0·06 to 0·3 Gm.**).

In greenish-white crystals, soluble 1 in 60 of water; when taken internally is easily assimilated by the system.

Calcii Lactophosphas.

Dose.—3 to 10 grains (**0·2 to 0·6 Gm.**).

Crystalline or amorphous powder. Is often a mixture of equal parts of calcium lactate and (dibasic) calcium phosphate. Soluble in water. Stomachic tonic. In cardiac disease useful (Brunton).

This salt has properties similar to Calcium Lactate *v. antea.*

Plumbi Lactas. $(C_2H_4OH.COO)_2Pb=385{\cdot}31$

A white crystalline powder, soluble in water.

Sodii Lactas. $C_2H_4.OH.COONa=112{\cdot}055$.

Dose.—5 to 10 grains (**0·3 to 0·6 Gm.**).

Usually in form of yellowish syrupy liquid miscible with water, containing 75% of the salt. Large doses are said to be hypnotic.

In scorbutic symptoms this is better than sodium citrate.

Gas gangrene rapidly cured by injection of 20 Gm. in an acute toxæmia.—B.M.J. i./17, 53.

In diabetes mellitus, when there is tendency to acidosis, give Sodium Lactate or Citrate in 40 grain doses, thrice daily.—Sir William Willcox. Three cases treated.—B.M.J.E. ii./21,14. See also Therapeutic Index.

Prior to the use of Chloroform, the administration of Sodium Lactate has been suggested to prevent possible acidæmia.

Elixir Sodii Lactatis. *Dose.*—1 drachm=10 grains.

Prepared with Simple Elixir (B.P.C. 1894), this is a palatable and convenient method of administration.

Syrupus Calcii Lactophosphatis (*Off.*).

Dose.—½ to 1 drachm (**2 to 4 Cc.**).

Mix Calcium Lactate 7·5 with Water 40 and add Concentrated Phosphoric Acid 4·5 (volume), dissolve and add Orange Flower Water 2·5. Filter and dissolve Refined Sugar 70 in the solution without heat and add Water *q.s* to make 100.

Dusart's Syrup. *Dose.*—2 drachms to ½ ounce (**8 to 15 Cc.**).

Calcium Carbonate 9, Lactic Acid 75% 22, Phosphoric Acid 10% 88, Water *q.s.* Dissolve the Calcium Carbonate in the Lactic Acid diluted to 108 with Water with the aid of heat. Cool and add the Phosphoric Acid, and make up to 370. Dissolve in this Sugar 623, and add Spirit of Limes 7. Mix and adjust to 1,000. *All parts by weight.*

Liquor Calcis Lactophosphatis. Lactophosphate de Calcium Dissous. Fr. Cx.

Rub Dibasic Calcium Phosphate 17, smoothly with Water 964, add Lactic Acid 19 (Fr. Cx., Sp. Gr. 1·24, practically pure acid) —all by weight. Shake to dissolve; filter.

Syrupus Calcii et Ferri Lactophosphatum.

Dose.—½ to 1 drachm (**2 to 4 Cc.**).

Dissolve by aid of slight heat Ferrous Lactate 150 grains with Potassium Citrate 150 grains in Water 1 ounce, and add to Syrup of

Calcium Lactophosphate 20 ounces. We acknowledge the N.F. for the suggestion to use Potassium Citrate. Our preparation has, however, always been 1 grain Ferrous Lactate in the drachm, *i.e.* double the strength of that in N.F. This strength is therefore retained.

ACIDI LACTICI BACILLI.

It will suffice to give here the salient points of Prof. Metchnikoff's well known Lactic Acid Bacillus Therapy. In Vol. II. we deal further with the subject.

***Fermenlactyl,** (T.M. 297401 class 42 and 348311 class 3 assoctd. ***Lactigen** (T.M. 310058), ***Lacteol** (T.M. 317182), ***Lactobacilline** (T.M 321882, 290293 class 3, and 290294, 321883, class 42), ***Sauerin** (T.M. 297939), and ***Trilactine** (T.M. 302646) are commercial preparations of Lactic Acid Bacilli. **Liquid Cultures** are also on the market. These latter only remain active a month or less.

If properly made there is no reason why Lactic Acid Bacilli, in tablet form, should not keep good for months or even years.—W. H. M. It is stated that *moulded* tablets show a higher initial count of the bacillus than compressed tablets.

***Trilactine Tablets** contain *B. Caucasicum* as their principal active constituent.

They are intended for therapeutic use to be taken *per os* or for curdling milk (*vide infra*). For the former they are best taken in conjunction with a little milk sugar (the bacillus *does not ferment cane sugar or maltose*), *e.g.*, dissolved in a little boiled (and cooled) water.

Dose.—Three to six per diem after meals.

Trilactine Tabellæ with Chocolate basis are also prepared.

Dose and *uses* as above.

Trilactine Tablets, Intestinal, *i.e.*, coated to render them less likely to dissolve in the stomach juices than in the intestinal tract, are also prepared. These are not intended for the curdling of milk.

The treatment, according to severity and nature of the case, extends over one to three months.

Paraffin-coated Starch Tablets.

5 grains (**0·3 Gm.**) for use with Trilactine.

Metchnikoff made the mistake of assuming that some Starch would survive the action of both ptyalin and diastase, whereas in fact no starch does. The lactic organisms are, in consequence, starved in the intestines. Doumer suggests coating a proportion of starch with paraffin, melting at 44° to 45° C., and gives it simultaneously to assist growth or endurance of the organism. This is available in the intestines for the bacillus.—L. ii./21,570.

Patient must avoid—

Foods such as gravy, meat jelly, meat extracts, white of egg, fat meat, high game, &c., which would act as culture-media for proteolytic bacilli.

Lactobacilline-Glycogen Tablets contain in addition to Metchnikoff's Lactic Acid Bacillus, the spore bearing amylolytic organism *B Glycobacter*. This organism converts amylaceous substances into sugar in the intestine, and is said by Metchnikoff to be a favourable addition

Lactic Acid Bacilli—Curdled Milk. *Trilactine Milk.

Dose.—1 pint or more (less if not tolerated) per diem, divided into 2 or 3 portions.

After the bacilli have appeared in the stools, one daily dose, first thing in the morning or evening, is given. It is usually preferred during or after meals, but if taken on an empty stomach the organisms will pass through to the duodenum with less contamination with the stomach juices. It is desirable to undergo the treatment for 3 weeks, then stop for a period before proceeding again.

The patient should prolong the treatment. It should not be given up the second week if flatulence is produced or constipation increased.

Preparation of Curdled Milk.—This forms an agreeable mode of treatment with active Lactic Acid Bacilli. Absolute terilization of the milk before introducing the lactic organisms is essential. An organism dividing three times an hour (as mentioned in a contribution on " Surgical Methods " by Sir W. Watson Cheyne), which is a fair average, will give rise to something like thirty-three million bacteria in twelve hours. To kill all organisms in milk would necessitate exposure to a temperature of 108° to 120° C. (226° to 248° F.), which would give the milk an unpleasant flavour. Pasteurising at 140° F. is not sufficient to kill *B. tuberculosis* or the spores of the butyric bacilli. Metchnikoff, therefore, advised boiling for several minutes. For safety an hour would be preferable, but previously pasteurised milk as is supplied in London and other large cities, may be used after ' bringing to the boil.'

We find the organism grows best at about 44° C. (110° F.) *N.B.* —Acid production ceases at a slightly higher temperature.

The required quantity of milk (a pint or a quart being a customary day's supply), cooled to about 40° C. (104° F.) (this can be done expeditiously by standing the saucepan with lid on, in a basin of cold water), is placed in a suitable jar or basin so arranged with a small light beneath that a temperature of 40° to 45° C. (104° to 113° F.) —not higher—can be maintained for eight to ten hours,—a ventilated dry heat (hot air) will work satisfactorily. For a pint of milk two or more active Lactic Acid Bacilli Tablets—the quantity varies with the different brands—are crushed, *e.g.*, with a spoon, in a little of the previously heated and then cooled milk (reserved for the purpose), to make a paste and stirred into the remainder of the milk in the jar. For a quart four or more tablets should be employed. The milk will then (or a little later *v. infra*), have formed a junket ready for consumption. If the Curdled Milk be ' over made ' (*i.e.*, much whey formed on the top), the heat must be reduced till the correct adjustment is ascertained.

Curdled Milk may be taken, according to taste, either with sugar, or with cream and sugar, or with sugar and a little powdered cinnamon, or ginger as flavoring. It is usually taken 12 to 24 hours after

souring has been started. Metchnikoff recommends it to be made from skimmed milk "as it is undesirable to absorb too much fatty matter." Providing one has a strain of organisms that does not decompose fat to too great an extent and produce a bitter-tasting product, this, perhaps, is open to discussion. We find in our experiments that, at any rate after 8 to 10 hours, *B. Caucasicum* is in great preponderance in the cream when ordinary milk is used,—the bacilli appear to be carried up with the milk fat.

The milk must be free from preservatives and in all respects as fresh and pure as can be obtained.

B. Acidophilus.—Cheplin and Rettger say Metchnikoff worked with this and not *B. Bulgaricus*.—Pres., Dec. 23,408.

Pharm. Form. says acid-production in milk begins immediately the milk is drawn from the cow, and in 48 hours sufficient acid (1%) is produced to coagulate the milk at normal temperature. For this reason dairy farmers add sodium bicarbonate by rule of thumb, to counteract acidity and act as preservative. Some medical men think sodium lactate to be provocative of diarrhœa, and object to the addition.

Uses, Contra-Indications and References to Lactic Acid Bacilli Tablets and Curdled Milk.—Both the Tablets and the Curdled Milk are used for summer diarrhœa in children, diarrhœa and constipation in adults, skin affections, such as eczema and psoriasis, acne and furunculosis, infective disorders of the intestinal tract, such as typhoid, dysentery, for intestinal tuberculosis and tuberculous diarrhœa, and for cancer of the stomach or intestines, and in enteritis and colitis generally. Also as a cholagogue in hepatic congestion and gallstones, and in threatened appendicitis. Beneficial in migraine, neurasthenia, loss of appetite and allied disorders. The Milk acts as a lubricant to the digestive tract, forming a pleasant article of diet, and may be taken in comparative health, as a nutrient and antiputrefactive.

Contra-Indications.—In some cases, notably in chronic acid gastritis, the stomach will not tolerate the Curdled Milk. Many cases of enteritis are aggravated by milk in any form. Personal idiosyncrasy also enters into consideration. Suitable cases, those in which abnormal putrefaction of proteid. Unsuitable, where symptoms due to carbohydrate fermentation.—G. Herschell, B.M.J. i./10,21.

For Trilactine Milk medicated with a variety of chemicals, see Vol. II.

Rhino-Lactéol Bouchard. A preparation, in powder form, of the Lactic bacillus in Lactose.

Directions: 8 or 10 'pinches' to be snuffed into the nostril with a deep breath, the opposite nostril being closed.

For use in coryza, hay fever, ozæna, sore throat, influenza, also suggested to be puffed into the ear for suppurative otitis and otorrhœa.

Whooping cough treated. A few grains blown up the patient's nostril with an insufflator, four times daily—whoop disappeared.—F. Parry, L. i./23,78.

Liquid Lactic Acid Bacilli Preparations.

Some hold that Liquid Preparations are preferable to Tablets. Tablets will make a good curd if of correct composition.

Local Use of Lactic-Ferment Preparations.—A fresh culture of lactic acid organisms has been used to free the urethra from bacteria, *e.g.*, in gonorrhœal infections. An ounce injected night and morning for a week resulted in lactic organisms only being found.

Vaginal Suppositories of Lactic Acid Bacillus—A hard gelatin capsule (No. 11) is filled with Syrupy Glucose—one daily for gonorrhœa. Upon decomposition of the glucose, acid is formed in which the large Bacillus Doderlein—a normal inhabitant—can grow. The acid kills off the pathogenic bacteria.—P. H. Marsden, P. J. i./20,365.

Cystitis has been treated by irrigation of the bladder with *B. Bulgaricus.*

Vulvitis treated by smearing a paste of Bulgarian soured milk all over the vulva introducing if necessary a tampon soaked in it into the vagina. Combine this with gonococcic vaccine.—T. J. Abraham, Clin. Jl., Feb. 14/23,73.

Dental use of Lactic Acid Bacilli. It was found that liquid cultures of the *B. Bulgaricus* were capable of destroying streptococci and staphylococci in cultures taken from a root canal, further that root canals inoculated with staphylococci resulted in their disappearance.

Milk cultures of *B. Bulgaricus* (in preference to bouillon cultures) can be ntroduced into root canals without causing discomfort to the patient. Such canals were mechanically cleansed, dried and cultures introduced and sealed with temporary fillings, and left in for varying periods of time. On reopening and bacteriological test nothing was found except the live *B. Bulgaricus.* The method has been tried in granulomata, cysts, sinuses and in pyorrhœa.—H. C. Moxham, D D.S., President of the Society of Dental Science (N.S.W.), Dental Science Journal of Australia, Vol. II., March 1st, 1922. No. 3. Trials in London, however, have not been encouraging.

Buttermilk Composition of.—Protein 3, Fat 0·5, Sugar 4·8, Water 91 per cent.

Contains less fat than soured milk. The ordinary Lactic Acid Bacilli found n this are not so active nor resistant as those contained in Bulgarian Sour Milk. Milk in any form, however, in sufficiently large quantity tends to lessen internal putrefaction.

Erysipelas has been cured by Buttermilk internally and locally.—F. S. Arnold, Pr., May, 1913,300.

Malnutrition in Infancy. Some cases of atrophy appear to do well on skim buttermilk or unskimmed diluted Lactic Acid Milk. Indeed most children over three months tolerate large quantities of milk if previously soured.—C. Chisholm, L. ii./22,497.

ACIDUM NITRICUM.

"*Poisonous—Not to be taken.*" *For Conditions of Sale v.p.* 48.

HNO_3=63·016.

Dose.—1 to 4 minims (**0·06 to 0·25 Cc.**).

(*Off.*) Sp. Gr. 1·42, contains 70% by weight hydrogen nitrate. U.S. 68%; PH. NED., 50%; P. Helv., 25%; FR. CX., 63·64%; P. Ital., 65·3%.

Uses.—Strong oxidising agent. A caustic to warts and condylomata. Acne pustulata has been treated by stabbing with a stick dipped in it.

Quantitative Estimation.—By reduction with nascent Hydrogen into Ammonia, which is precipitated as Ammonio-Platinic Chloride or titrated with Standard Hydrochloric Acid.

A direct method of estimation is with the aid of Nitron (diphenylene-anilodihydro-triazole, which gives an insoluble nitrate—the precipitation being quantitative. It also precipitates Picric Acid.—C.D. i./17,286.

Acidum Nitricum Dilutum (*Off.*).

Dose.—5 to 20 minims (**0·3 to 1·2 Cc.**).

Contains (*Off.*), U.S. and P. Helv. 10% by weight. Ph. Ned. quadri-normal. Fr. Cx. 10% approx. Tonic and biliary stimulant.

Incompatible with alkalis, sulphides, hyposulphites, ferrous sulphate, and alcohol.

Antidotes as for Hydrochloric Acid, *q.v.*

Chloroform in 5 drop doses every ten minutes will prevent the convulsions following the inhalation of nitrous fumes, as in the accidental breaking of a bottle of nitric acid.—C.D. ii./05,130.

Poisoning by small quantity taken in mistake.—B.M.J. ii./08,1679.

Acidum Nitricum Fumans. '*Poisonous—not to be taken.*' Sp. Gr. 1·5. (P. Jap. 1·486 to 1·5; P.G. has 86%, Sp. Gr. 1·486).

A reddish-brown liquid, giving off yellowish-red fumes. Contains about 91% by weight of hydrogen nitrate. Used as a caustic.

Acidum Nitro-hydrochloricum, U.S. (Strong).

Nitric Acid 9, Hydrochloric Acid 41, to produce 50. *Poisonous.*'

Aqua Regia is Nitric Acid 3, Hydrochloric Acid 4. '*Poisonous.*'

℗ACIDUM OXALICUM.

$(COOH)_2 2H_2O = 126{\cdot}058$.

White crystals soluble in water about 1 in 9; a powerful poison. Manufactured by acting upon wood, sugar, starch, etc., with Nitric Acid. The cerium and iron salts are used in medicine, *q.v.*

The toxicity of this acid in dilute solution and of its salts is due to the fact of their forming an insoluble calcium salt, a sufficient quantity of calcium in solution being essential for the welfare of the organism. Strong solutions of the acid are poisonous by corrosive action. Toxic symptoms and cardiac depression can be relieved by giving soluble Lime Salts.

Antidotes.—Apomorphine Injection, Calcium Saccharate Solution, Chalk, Castor Oil, Stimulants. Do *not* give alkalis, *e.g.*, Soda or Potash which form *soluble* oxalates.

Sal Limonis.—Salt of Sorrel or Sal Acetosella, Salacetos, consists of a mixture of Acid Potassium Oxalate (or Binoxalate) $COOH.COOK + H_2O = 146{\cdot}134$ and Potassium Tetroxalate (or Quadroxalate) $COOH.COOK + COOH.COOH + 2H_2O = 254{\cdot}176$ (Bernthsen). It is used for removing ink stains, iron mould, cleaning leather, &c., and removing the colour from calico printing. Has been given for scurvy. *Dose.*—$\frac{1}{4}$ to $\frac{1}{2}$ grain. Is very poisonous, with which word it must be labelled.

The Binoxalate according to Tyrer contains $2H_2O$.—P.J. ii./12,157.

"*Poisonous—Not to be taken.*"—*Soluble Salts of Oxalic Acid. In Ireland, according to the Sale of Poisons Act (Ireland) 1870, Oxalic Acid and all Oxalates are Part II. Poisons (of that Act), therefore can only be sold by registered persons. For further Conditions of Sale see p.* 48.

'Potassium Binoxalate' is usually understood to be Acid Potassium Oxalate as above

ACIDUM PHOSPHORICUM CONCENTRATUM.

H_3PO_4=98·064.

Dose.—1 to 4 minims (**0·06 to 0·25 Cc.**).

Antidotes.—As for Hydrochloric Acid, *q.v.*

Hydrated Phosphoric Acid, containing 66·3% of hydrogen orthophosphate, corresponding to 47·4% of phosphoric anhydride; Sp. Gr. 1·5. Commercially, it is also prepared, having Sp. Gr. 1·75, and containing 64·3% of the anhydride=88·8% H_3PO_4 (U.S. is 85% H_3PO_4). If of this strength it may be reduced to B.P strength by adding to each 3 parts by weight 1 part of distilled water.

Fr. Cx. and P. Ital. 50% by weight of H_3PO_4. Sp. Gr. 1·349.

'**Acidum Phosphoricum**' P.G.V. and Ph. Ned., is 25% H_3PO_4.

See Vol II. for Analysis and further details.

Acidum Phosphoricum Dilutum (*Off.*).

Dose.—5 to 20 minims (**0·3 to 1·2 Cc.**).

Contains *Off.*, U.S. and P. Helv., 10% H_3PO_4 Sp. Gr. 1·057.

Dilute Concentrated Phosphoric Acid (66·3%) 106·3 Cc. with Distilled Water. *q.s.* to 1000 Cc.

Incompatible with alkalis, ferric chloride, lime salts.

Uses.—A nerve tonic and hæmatinic. Said to increase the proportion of phosphates in the red blood corpuscles, and to increase the coagulability of the blood. Well diluted, is a pleasant cooling drink in fevers, and relieves thirst in diabetes. It renders iron preparations compatible with astringent vegetable infusions.

ACIDUM PICRICUM (*Off.*).

P. Jap.; Fr. Cx. *Syn.* Carbazotic Acid; Trinitrophenic Acid.

$C_6H_2.OH.NO_2.NO_2.NO_2$ [1 : 2 : 4 : 6]=229·078.

Dose.—$\frac{1}{4}$ to 2 grains (**0·016 to 0·12 Gm.**).

Is formed by cautiously adding phenol to fuming nitric acid, heating the mixture, and purifying by re-crystallizing. It is in yellow, shining, bitter tasting crystals, which melt at 125·5° C.—the yellow liquid may be distilled without decomposition. Heated rapidly to 300° C. in the open it burns.

For details of Picric Acid and other compounds as explosives, see Vol. II.

Solubility.—1 in 90 of water with yellow colour, and 1 in 10 of alcohol 90%, and in ether about 1 in 20.

Use.—Solutions or ointment are applied in the treatment of burns, erysipelas, pruritus, eczema, chilblains and gonorrhœa.

In phthisis, *inhalation* of Vapour from 60 Gm. dissolved in 1000 Cc Water heated to boiling,—daily for 2 to 3 hours gives good results, even cures, it is stated.

In stomatitis mercurialis a watery paste of the acid has been applied to the parts every 2 days—relieves pain and removes ulceration.

Poisoning by application of.—A child of 2 to 3 months. Severe burn of the foot from boiling water treated with a dusting powder containing varying amounts, 7 to 17% of the Acid. Vomiting and severe diarrhœa. Temperature rose to 100° F., and pulse varied from 100 to 150. General erythema developed, and child died on 22nd day after the accident. —South African Med. Record, July, 1912, per L. ii./12,471.

Picric Acid 6 grains in 2 grain doses at intervals of some hours taken without harm. Turns urine orange coloured.—Walter Smith, B.M.J. i./17,618.

Lotio Acidi Picrici, 1% aqueous (St. Th. H.).

For burns cotton wool impregnated with this lotion is used. Recommended by H.M. Inspectors of Explosives to keep handy as First Aid for burns.

After 48 hours remove and wash with Potassium Permanganate 5 grains in Water 16 ounces. Washing with weak ammonia and then with hydrogen peroxide removes the stains.

The method is not always satisfactory—may cause toxic symptoms. Cleaning the parts and rubbing off blisters with Alcohol—under Chloroform anæsthesia—is preferred by E. C. Milligan, Austral. Med. Jl., Jan. 4/13. *See* abstract p. 126.

Gauze and Wool, impregnated with **Picric Acid,** are prepared.

In naval warfare Picric Acid found efficacious as a first dressing to burns, but subsequently moist, and mild antiseptics found more suitable.—Surgeon-General H. D. Rolleston, B.M.J. i./17,224; L. i./17,258.

Burns due to Cordite were treated on H.M S. "Lion" and "Tiger" in the Jutland battle with Picric Acid solution. Found a suitable dressing, but if left on too long it dried and was difficult to remove. As a second dressing 5% mixture of Eucalyptus in Olive Oil, sterilised by boiling, and if acid made alkaline by Lime Water.—B.M.J. ii./16,598.

Gonorrhœa treated by 1 in 400 to 1 in 200 solution as irrigant. An extremely potent germicide, and good when tolerated.—D. Lees, B.M.J. ii./21,480.

Gonorrhœa in women treated with a douche of two teaspoonfuls of Picric Acid in 64 ounces of hot water followed by Protargol Tampon and Ointment.—B. W. Turner, Abst. Pres., Oct./20,363.

Pigmentum Acidi Picrici et Camphoræ.—Picric Acid 2, Camphor 50, and Alcohol 90% to 100. Ringworm well treated by this Pigment.—A. Savill, Pr. July 13/94.

Sig.—"Inflammable. To be painted all over the scalp twice daily." The hair is to be clipped quite close, and the scalp washed once or twice a week, and covered by a calico cap. Generally the ringworm hairs are loosened, and come away with their bulbous portions in from ten to thirty days. A slight yellow staining of the hair may be noticeable some weeks after treatment. A. W. Williams, Brit. Jl. Dermat., June, 1912. Slightly modified.

C.D. ii./13,931 advises Picric Acid 1 drachm, Camphor 2 drachms, Alcohol 4½ ounces, to be painted on scalp, after previously washing with Ether, until there are no diseased hairs left.

Unguentum Acidi Picrici, 1 to 3%, for pruritus of scrotum and gonorrhœa.

For burns : Relieves pain and may be left 48 hours without changing. For burns of the eye, Ointment 2% better than solution. Instillation of a little cocaine solution beforehand.—B.M J.E.ii./08,36.

'**Collapsubes**' of Picric Acid Ointment, ½% in soft paraffin basis, are supplied with catheter attachment for urethral medication.

Papillary erosions of the cervix uteri have been treated with saturated alcoholic solution swabbed for three minutes twice or thrice weekly.

Vaccinated surfaces treated by painting with a 4% alcoholic solution 48 hours after insertion of the lymph, lessens the degree of reaction. Makes a kind of natural dressing. Picric Acid is stated to be about four times as efficient as phenol as a local antiseptic.

Wounds, apart from burns, have been well treated.

Ammonii Picras.—$C_6H_2(NO_2)_3O.NH_4$=246·11.

Dose.—$\frac{1}{6}$ to $\frac{1}{3}$ grain (**0·01 to 0·02 Gm.**) in solution.

Yellow crystals *exploding* if rapidly heated in a test tube, but without loud detonation. To our knowledge 4 ozs. in a bottle were dropped and the bottle broken on the stone footway without exploding.

Soluble 1 in 100 of Water, 1 in 85 Alcohol.

Uses.—This and the Potash Salt have been thought to act like Quinine; they are also used for hardening tissues prior to microscopic examination and as a urine test for albumin, *q.v.*

Malaria is well treated by Ammonium Picrate. It is used in some intensely malarial districts.—Maj. E. E. Waters, I. M. Gazette, March and July, 1913.

Mistura Ammonii Picratis.

Dose.—½ ounce (**15 Cc.**) thrice daily.

Saturated Ammonium Picrate Solution 30 minims, Syl Aurantii 1 drachm, Water to ½ ounce.

Flavoring.—Alternatively Syl Limonis vel Syl Vanillæ.

Its use is particularly indicated after febrile diseases with loss of appetite and asthenic condition. Generally given with a clean tongue, but even when dirty the salt does not seem to disagree. Never found to have disagreeable after effects. It takes the place of strychnine to a great extent, and is a really valuable drug. In explosive factories it is stated workmen take it as a bitter tonic.—F Fowler Ward, Ipswich.

We have seen a statement that 12 grains have been given with Chloroform 1½ minims and Water to 1 ounce. Apart from the insolubility it is *doubtful whether this dose is safe therapeutically.*

ACIDUM PYROGALLICUM.

Syn. Pyrogallol, $C_6H_3(OH)_3$ 1 : 2: 3=126·078.

Dose.—½ to 1½ grains (**0·03 to 0·1 Gm.**) in aqueous solution, or in pills with syrup—freshly prepared, and kept from the light.

Manufacture.—By heating gallic acid.

It has great affinity for oxygen. A specially pure acid designated "Resublimed Medicinal," is prepared for internal administration.

In light small white odourless crystals, with M.Pt 131 to 132° C., producing a sensation of coolness on the tongue.

Solubility.—One in 2 parts of water, about 1 in 1 of alcohol 90%, and in 10 parts of melted lard.

Uses.—Antiseptic in skin affections and in ringworm. Ointment 2 to 10% sometimes combined with Salicylic Acid 2 to 5% and Ichthyol about 5%. It darkens the skin, used with Silver Nitrate blackens the hair. Large doses poisonous. Seldom used internally.

It is astringent for hæmoptysis in doses of a grain every half hour. It has been prescribed with ergot for this and stated not to cause vomiting nor to derange the stomach.

Lupus vulgaris, if the area is not too large, 40% plaster as caustic, afterwards 10% Ointment is a good treatment, or apply the Ointment for a long time (until blister rises), then proceed with 2% Ointment, finally with a weak (0·1%) ointment.

Acidum Pyrogallicum Oxidatum (*Syn.* PYRALOXIN). A brownish insoluble powder prepared by the action of air and ammonia on Pyrogallic Acid. 3 to 10% ointment for skin affections.

Eugallol, $C_6H_3(OH)_2(CH_3COO)$ = 168·104, Pyrogallol-Monacetate.

Manufacture.—Add Acetyl Chloride 78 to Pyrogallol 126 with stirring. When thoroughly mixed heat to 60° C. ½ hour. Neutralise the syrup with Sodium Carbonate and extract with ether. This product is mixed with 50% Acetone (*i.e.* 2 of product and 1 of Acetone).

A yellowish syrupy liquid, applied in skin affections mixed with an equal quantity of acetone with a brush. **Lenigallol.** Pyrogallol-Triacetate, $C_6H_3.(CH_3.COO)_3$ = 252·156 in white powder, is much weaker, may be used with zinc paste in acute and chronic eczema.

Manufacture.—Lenigallol is made by combining Pyrogallol 1, with Acetic Anhydride 3, in presence of fused Sodium Acetate 3 at boiling temperature. The oily compound solidifies on cooling, and is recrystallised. M.Pt. 157° C.

ACIDUM SALICYLICUM (*Off.*).

$C_6H_4.OH.COOH$ 1 : 2 = 138·083. *Syn.* ORTHO-OXY-BENZOIC ACID.

Meta and *para* Oxybenzoic Acids have very feeble action of any kind—either anti-rheumatic or anti-fermentation. Much larger doses—135 and 180 grains respectively—are required to kill rabbits than with Salicylic Acid (60 to 90 grains).—R. Stockman, B.M.J. i./13,598.

Dose.—5 to 20 grains (**0·3 to 1·2 Gm.**) in cachets.

FR. CX. *Max. single dose* 1 Gm.; max. during 24 hours 4 Gm.

Manufacture.—Salicylic Acid (artificial acid) of commerce is made by H. Kolbe's method devised in 1874, by heating Sodium Phenate in a current of Carbonic Acid, or by a modification of it. The Basic Sodium Salicylate so formed is decomposed with Hydrochloric Acid. A modification (R. Schmitt's) consists in heating the Phenate and Gas under pressure; this is more economical.

Potassium Phenate is also employed as starting point.—C.D. ii./14,313.

The manufacture of Salicylic Aldehyde—an intermediate product in making Salicylic Acid and Aspirin is covered by Patent 8096/1909, "Process of Manufacture of Phenol—Esters chlorinated in the side chain, and of oxybenzylalcohols, oxybenzaldehydes and oxybenzoic acids," and by Patent 3053/1914, "For preparation of Esters of Phenol homologues halogenised in the side chain."

The Comptroller recommended that licences should be granted for their use to a British firm. By the first Patent, it would be possible to employ Cresol instead of Phenol—a commodity much required for national purposes. —C.D. ii./16,925.

It may also be prepared from Salicin and from Oil of Wintergreen (*Gaultheria procumbens,—Ericaceæ*) and sweet birch (*Betula lenta,—Betulaceæ*). **For internal use** this NATURAL ACID is preferred. An artificial acid, **Physiologically Pure**, is also free from impurities. **"Powdered Acid"** forms the third variety.

In colourless prismatic crystals, odourless, but its dust irritates the nostrils, taste sweetish. M. Pt. 156° to 159° C.

Soluble 1 in 500 of cold water, 1 in 3·5 of 90% alcohol, 1 in 40 of 45%, 1 in 2 of ether, about 1 in 80 of olive or almond oil, 1 in 100 of castor oil, 1 in 200 of glycerin, and 1 in 55 chloroform; soluble also in melted fats and soft paraffin; 20 grains of salicylic acid are rendered soluble in an ounce of water by the addition of 25 grains of borax. Ammonium citrate and sodium phosphate also increase its solubility.

Incompatibility.—Spirit of nitrous ether, quinine salts, sal volatile. An aqueous solution of the acid gives a deep violet colour with a trace of a persalt of iron.

Uses.—Anti-fermentative and anti-putrefactive. For various febrile conditions generally as one of its salts, particularly for acute rheumatism. See also Sodium Salicylate. In stomatitis a saturated aqueous solution is used. Large doses alone act as a direct poison on the heart and respiration. For sweating feet Pulvis Salicylicus cum Talco is used. It is applied locally to corns, warts, and lupus

Hypodermically, suspended in oil has been injected at seat of rheumatic pain. A saturated aqueous solution as **Rectal Injection** has been used for dysentery of children.

To eradicate stumps left after removal of papillomatous growths 1 to 6% solutions in spirit. It may also be used dissolved with sodium sulphoricinate.—*q.v.*

In treatment of rheumatic fever the acid or the salt employed either kills the organism or neutralises the toxin. The patient should have a large dose at once so as to kill off the microbes while they are still in the blood stream or joints before they have had time to become firmly established in the fibrous tissue or in the valves of the heart.

For scarlatinal sore throats, tonsillitis, compresses of 2% Alcoholic Solution found of value. In gonorrhœa, may prove irritant, necessitating periodical dropping and renewal.

Typhoid should be treated by 3 to 5 grain doses given with milk so as to be carried more quickly into the bowel.—A. Wilson, B.M.J. i./15,331.

To remove tattoo marks, mass Salicylic Acid with glycerin to a dough—apply over the marks with a compress and strips of adhesive plaster and allow to remain in contact for a week. After the first dressing the epidermis over the marks is removed and a fresh application of the Salicylic paste applied. Usually the second application removes. *See also* Papain.

Septic wounds treated by hypertonic saline to which 2 to 3 drachms of saturated solution of Salicylic Acid in Alcohol is added to the pint—the crystals thrown out are deposited on the wound. Salicylic Gelatin 2 to 4% also used.—L. G. Anderson and co-workers.—L. i./16,1119.

Elixir Acidi Salicylici Compositum.

Dose.—1 drachm (4 Cc.) in water.

Each ounce represents Salicylic Acid 40 grains, Gelsemium 15 grains, Cimicifuga 15 grains, Potassium Iodide 4 grains.

A proprietary preparation for use in chronic gout and rheumatism, lumbago, and sciatica. It is antirheumatic, analgesic and the eliminative action of small doses of Potassium Iodide is useful.

Ⓟ**Emplastrum Acidi Salicylici Saponatum.** Salicylic Acid 2½, 5 and 10% in Emplastrum Saponis.

Amyl Salicylate. $C_6H_4.OH.COO.C_5H_{11}=208{\cdot}188$.

Substitute for Methyl Salicylate, with much less odour. For painting on to rheumatic joints.

Capsules of Amyl Salicylate contain 3 minims (**0·2 Cc.**) for internal medication.

Unguentum Amyl Salicylatis Compositum. *Syn.* **'Amysal.'**

Similar to Methysal Balm *q.v.* but made with Amyl Salicylate Odour more pleasant.

BORNEOL SALICYLATE. *Syn.* ✱**Salit** (T.M. 258851). In muscular rheumatism and acute neuralgia, by inunction or by painting over affected part. Apply ½ to 1 drachm, with equal quantity of olive oil.

Oleum Gaultheriæ (*Off.*). *Syn.* WINTERGREEN OIL.

Dose.—5 to 15 minims (**0·3 to 1 Cc.**).

The Distillate from *Gaultheria Procumbens, N.O. Ericaceæ*, and from the bark of *Betula Lenta* (*Betulaceæ*) are practically identical, *cf.* Methyl Salicylate. *Characters and Tests.*—Colourless liquid with strong characteristic odour and pungent taste. Sp. Gr. 1·180 to 1·187; O.R., 0° to—1°; R.I., 1·537 to 1·539; Soluble 1 volume in 6 of 70% Alcohol at 25° C. Should contain at least 99% Methyl Salicylate determined by the saponification process. Stimulant and diuretic.

Maceration for 12 to 24 hours of the leaves prior to distillation is necessary for the best yield, the oil being a "ferment" oil not pre-existing in the plant, but occurs as a non-odorus glucoside, which must be hydrolised by the ferment before distilling.

Capsules of Oil of Gaultheria—10 minims in each. *Dose.*—One three times a day or oftener.

The oil has similar properties to salicylic acid. 10 to 20 minims are given every 3 or 4 hours in rheumatism and sciatica. With olive oil externally for rheumatism.

Methyl Salicylas (*Off*). (98% pure). $C_6H_4.OH.COO.CH_3=152{\cdot}104$.

Artificial (or Synthetic) Oil of Wintergreen.

U.S. IX. gives Oleum Gaultheriæ and Oleum Betulæ from the bark of *B. lenta* (Sweet Birch) as synonymous with Methyl Salicylate.

A colourless liquid, with odour like above oil. ***Manufacture.***—May be prepared by carefully distilling a mixture of Salicylic Acid 2, Methyl Alcohol 2 and Sulphuric Acid 1. Sp. Gr. 1·185 to 1·192. ***Soluble*** in 90% alcohol, ether, chloroform or glacial acetic acid. Applied covered with impermeable tissue is quickly absorbed.

In local rheumatic pain the most efficient application.—R. Stockman, B.M.J. i./13,597. Also used for furunculous ulcers, orchitis, and mumps.

Bile secretion is increased by Methyl Salicylate *per os* without causing loss of body weight. Animal experiments.—P.J. ii./16,615.

✱ **Methysal Balm** (T.M. 303967).—*Martindale.* *Syn.* **Unguentum Methyl Salicylatis Compositum.**

Contains Methyl Salicylate 7, in combination with Menthol 5%. Also prepared containing 25% and 33% Methyl Salicylate (with Menthol 5%). For analgesic effect in rheumatism. Supplied in **Collapsubes.**

It relieves pruritus and is suitable as a general antiseptic Ointment. For muscular rheumatism of the limbs, which it cures (W.W.W.), it is best applied after fomenting the part with hot water.

Chloral Hydrate 1 to 5% has been suggested as an addition to creams of this kind. Oil ot Cajuput is also used.

Linimentum Methyl Salicylatis, *Martindale.*

Methyl Salicylate 20, Menthol 10, Chloroform 10, Camphor 10, Eucalyptus Oil 10, Turpentine Oil 10, Lavender Oil 5, Liquid Paraffin to 100. For use similar to the above.

Opium Tincture or Belladonna Liniment 10 to 20% may be added if required, but they do not mix with the Salicylate Liniment.

Preparations designated **"Betulol," "Linimentum Betulæ Compositum," and Baume Analgesique,** are supplied.

Unguentum Acidi Salicylici Terebinthinatum—Salicylic Acid 1, Oil of Turpentine 1, Lanolin 1.

The above are of value in rheumatic affections, applied to joints on lint covered with guttapercha tissue and flannel bandage.

Methyl Salicylate Plasters (machine spread) are prepared of size 5 inches by 7 inches, and are useful in lumbago, sciatica, and rheumatism.

'Trichlorophenyl-Iodomethyl-Salicyl' described as 'T.C.P.' A non-poisonous liquid preparation for local use to wounds and burns, in nasal catarrh, pyorrhœa and skin affections, for relief from the pain of bites and stings, and as a preventive against influenza and malaria. It is also used as a remedy for chilblains, piles and as a general antiseptic application.

Balmosa. A non-greasy, analgesic cream, containing Methyl Salicylate and rubefacients.

Ethyl Salicylate. $C_6H_4.OH.COOC_2H_5 = 166{\cdot}125$.

A colourless liquid with aromatic odour. Soluble in alcohol. Injected subcutaneously or intravenously. Not nearly so toxic as methyl salicylate. Stated not to be absorbed into the system either by inhalation or when applied to the skin.—Am. Jl. Ph., 1905,331.

Can be used as a substitute for Methyl Salicylate. The substitution of the Ethyl for the Methyl group should make little difference for absorption. It has Sp. Gr. 1·13. Boiling point 225 to 234°.—P.R., Dec. 1915.

Ethoxy-Methyl Salicylate $C_6H_4.OH.COOCH_2O.C_2H_5 = 196{\cdot}146$. *Dose.*—15 grains (**1 Gm.**).

A new synthetic introduced by Foran of MacGill University, 5 times more soluble in water than Aspirin, which it is said to equal therapeutically.—P.J. i./23,88.

Salicyl Salicylate. *Syn.* ✱ **Diplosal** (T.M. 303704.)

$OH.C_6H_4.COO.C_6H_4.COOH. = 258{\cdot}15$

Dose.—15 grains (**1 Gm.**) in cachet or tablets.

Salol in which the phenyl group is replaced by Salicylic Acid. White odourless needles melting at 147° C. Insoluble in water and dilute acids, soluble in alcohol. Used for rheumatism, neuralgia, and cystitis.

Pharmacological experiments showed that the compound remained unchanged for 6 hours in the gastric juice, but was decomposed in 2 or 3 minutes in the duodenal secretion. Hence it does not cause gastric disturbances in therapeutic doses.

Granular Effervescent Salicylic Acid contains 5 grains in 60 grains. *Dose.*—1 drachm (**4 Gm.**).

Liquor Acidi Salicylici.

Boiling Distilled Water 1,000 parts, Salicylic Acid 1½ parts. Useful in preparing solutions of alkaloidal salts, and may be employed as an antiseptic solvent for other salts; it is irritating to the eyes.

The late Prof. A. Gamgee strongly recommended this solution as an **Antiseptic Gargle.**

Guttæ Acidi Salicylici Compositæ, St. M.'s H. Salicylic Acid 10 grains, Boric Acid 20 grains, Glycerin 2 drachms, Methylated Spirit to 1 ounce.

Pasta Acidi Salicylici. 1 in Glycerin 9.

Pulvis Salicylicus cum Talco.

Salicylic Acid 3, Wheat Starch 10, Talc 87.

Mix to form a fine powder. For perspiration of the feet.

℗ Salicylic Cream.

Salicylic Acid, in powder, 2, Carbolic Acid 1, Glycerin 10; mix. G.H. had Salicylic Acid 1, Glycerin 9.

Used as pigment when the skin is irritated by the discharge from wounds, &c., under antiseptic dressings.

Oleum Acidi Salicylici.

Scabs in eczema are well treated by Salicylic Acid dissolved in Castor Oil.—We suggest 1 in 50. This dissolves on warming.

Unguentum Acidi Salicylici (*Off.*).

Salicylic Acid, in powder 1, White Paraffin Ointment 49. Useful in eczema, acne, ringworm and cancer.

In seborrhœa, the following is useful: Salicylic Acid 1, Precipitated Sulphur 2·5, Cold Cream 25.

Lupus vulgaris, scabies, acute eczematous dermatitis and ringworm treated by 50% Salicylic Acid Ointment.—Sir Archibald Reid, L. i./23,1325.

Unguentum Acidi Salicylici Compositum. *Syn.* WHITFIELD'S OINTMENT.

Salicylic Acid 1, Benzoic Acid 1, Cocoa Nut Oil 12, Soft Paraffin 16. For ringworm.—L. i./17,222.

Salicylic Gauze, Lint and Wool, each 4%.

Dissolve the Salicylic Acid in alcohol, *q.s.* (about 1=1 of dressing) and impregnate under pressure: dry.

Salicylosol.—A solution of Salicylic Acid in a partly oxygenated mineral oil. Used by massage into the skin. When 10 Cc. of the solution was rubbed into the skin, 0·137 Gm. of Salicylic Acid appeared in the urine in 24 hours. Hanzlik found that a normal person excreted 40% of a dose of a Salicylate given *per os.* in 24 hours. The absorption of Salicylic Acid from inunction is therefore only about one-third of the absorption of Salicylic Acid given *per os.*—B.M.J. i./22,233.

***Iodinosol** (T.M. 336541). A preparation containing 6 and 10% of Iodine in a base similar to Salicylosol for inunction.—B.M.J. i./22,233.

Ammonii Salicylas U.S. $C_6H_4.OH.COO.NH_4$=155·115.

Dose.—5 to 30 grains (**0·3 to 2 Gm.**). U.S.—*Average,* 8 grains.

In crystalline powder, very soluble in water.

Effervescent Ammonium Salicylate.

Dose.—1 drachm (containing 10 grains) or more.

Ferri Salicylas. *Syn.* FERRIC SALICYLATE. Composition varies.

Dose.—3 to 10 grains (**0·2 to 0·6 Gm.**).

Brownish powder, sparingly soluble in water, but readily in solution of Potassium Bicarbonate.

In tonsillitis as an antiarthritic tonic and as a dusting powder for foul wounds. Useful in erysipelas and acute tonsillitis in solution formed by interaction of 7½ grains each of Sodium Salicylate and Potassium Bicarbonate and 7½ minims of Ferric Chloride Solution B.P. with diluent *q.s.*—M.C.S. Lawrence, Pr. March '13,633

Mistura Ferri Salicylata. Cohen's Salicylated Iron Mixture.

Dose.—1 to 2 drachms (**4 to 8 Cc.**) increased.

Dissolve citric acid 14 in distilled water 200, add ammonium carbonate 6·5, then dissolve sodium salicylate 125 in this solution; add tincture of ferric chloride, 125, glycerin 175, and oil of betula 4, and then add sufficient distilled water to make 1,000. and filter.

The question has been asked: Do the Salicylates and kindred drugs stimulate or exhaust thyroid activity or do they actually neutralise it?

Magnesii Salicylas. $(C_6H_4.OH.COO)_2Mg, 4H_2O=370·534$.

Dose.—10 to 30 grains (**0·6 to 2·0 Gm.**).

Colourless crystals. ***Soluble*** 1 in 6 of water. Incompatible with acids and Sodium Bicarbonate. It has been given in typhoid.

In flatulence 15 to 45 grains thrice daily has been found useful.

Potassii Salicylas. $C_6H_4.OH.COOK=176·175$.

Dose.—5 to 30 grains (**0·3 to 2 Gm.**). A white crystalline powder, very soluble in water.

In cyclitis 15 to 20 grains of Salicylic Acid with an equal amount of Potassium Bicarbonate. Speedy relief, pains in the eyes, joints and limbs ceased, followed by a rapid absorption of the vitreous opacities. Pilocarpine injections not so useful. Inflammation of the uveal tract may be caused by the same microbes or toxins which cause specific fevers.—Oph. March, 1911, 183.

Sodii Salicylas (*Off.*). $C_6H_4.OH.COONa=160·075$.

Dose.—10 to 30 grains (**0·6 to 2 Gm.**) in a mixture or in cachets, 5 of salt=4 of acid. Fr.Cx. —*Max. single dose*, 30 grains. Max. during 24 hours 180 grains approximately.

Intravenously, doses as large as 15 grains (**1 Gm.**) have been given, also in combination with the same amount of Sodium Iodide (*see* Injectio Sodii Salicylatis).

In white scales or shining tabular crystals (of sweetish taste). For varieties in commerce, compare Salicylic Acid.

Soluble in water 1 in 1. Concentrated solutions should be made with hot water and filtered. In alcohol 90% 1 in 6 by experiment.—W. H. M.

Discoloration of Sodium Salicylate solutions due to ammonia avoided by floating a basin containing a pad of cotton wool soaked in a little Acetic Acid on the surface.—W. Macadie, P.J. i./15,355. See also Prof. Greenish, *ibid* 201.

Incompatible with free ammonia, ammonium carbonate, and aromatic spirit of ammonia (turns brown). Mineral and many organic acids cause separation of salicylic acid, *e.g.*, to dispense Sodium Salicylate with Tincture of Perchloride of Iron, dissolve 1 drachm of the salt in 2 ounces of Water, add 30 to 40 minims of the Tincture and 1½ ounces of a solution of Potassium Bicarbonate 1 drachm in 1 ounce, then Chloroform Water to 8 ounces. The result is a clear palatable claret colored mixture useful in rheumatic sore throats combined with anæmia.—L. i./11,1207.

Flavoring.—Syl Lavandulæ, Glyl Pini; Syrupus Aromaticus (not so good as the former). Extractum Glycyrrhizæ Liquidum, Syrupus Zingiberis.

Germicidal Action. Almost nil. For effect as antirheumatic *vide* abstract *infra.*—R. Stockman, B.M.J. i./13,598. *For our experimental work see Vol. II.*

Uses.—Rheumatism, neuralgia, diarrhœa (of young children said to be almost specific), vertigo, Menière's disease, malarial fevers and diabetes may all be well treated by salicylates. In influenza and acute tonsillitis, 10 grains every three hours relieve the distressing symptoms. Puerperal fever, biliousness, acute pains of fibrositis, nephritis, cystitis, urticaria and Graves' disease have been well treated with it. By some it is considered the most powerful of hepatic stimulants. It is one of the best intestinal antiseptics. Its solution forms an antiseptic wash for the bladder, but as a urinary antiseptic (*per os*) it has less action than Hexamine,—about 50% of that given is excreted as Salicyluric Acid.

In sciatica the electro-negative salicyl ions may be driven into the tissues.—*vide* Iontophoresis, *Vol. II.*

In acute rheumatism some advise very large doses, *e.g.*, 150 grains daily, with twice the amount of Sodium Bicarbonate or even *double* these amounts. Sodium Bicarbonate should always accompany it to prevent constipation.

Stockman has shown that the fall of temperature under treatment with Salicylate and return of joints to the normal, vary within limits with the dose administered.

Rectal injections of 8 Gm. in 150 Cc. with 1·5 Cc. Opium Tincture have been employed.

The COOH grouping *on* the Benzene ring in conjunction with the OH in the ortho-position seem to place Salicylic Acid at the highest point of efficacy of all anti-rheumatics; with 2COOH introduced as in Phthalic Acid efficacy vanishes. The Cresotinic Acids are the only bodies at all approaching Salicylic Acid in utility. It is not known definitely whether the Salicylates act as antitoxins or as antimicrobics. What is wanted is a remedy that will abolish or lessen the chances of injury to the muscles and valves of the heart in treatment of severe rheumatic affections. In acute rheumatism 90 to 160 grains or more in 24 hours act when infection is recent and when the inflammation is confined to joints, but when fibrous tissues of the heart valves or of the muscles *or* body generally are deeply implicated a more potent remedy is wanted.—R. Stockman, B.M.J. i./13,598.

Salicylates not specific in every form of affection called rheumatic. The pyrexia of acute polyarticular rheumatism was generally controlled within three days, but in the rheumatic state there was often a pyrexia ranging through two degrees, which continued even for weeks and was unaccompanied by any obvious manifestation of rheumatism. Such pyrexia was often uninfluenced by the Salicylates, though it might yield to Salol or Aspirin. The employment of the Salicylates in rheumatic hyperpyrexia was waste of valuable time. The cutaneous manifestations of rheumatism were uninfluenced. Neither the various forms of erythema purpura nor erythema nodosum appeared to be influenced and these manifestations had occurred while patients were actually taking the drug. The subcutaneous nodules, described by Barlow and Warner, were undoubtedly rheumatic in nature, but they were

quite uninfluenced by the administration of the Salicylates. The similarity of their structure to that of the inflamed valves of the heart in rheumatism was a powerful argument against the utility of the employment of Salicylates in endocarditis or pericarditis. The danger of upsetting the stomach with the irritant Salicylates must be borne in mind in the treatment of all heart affections, as also must the risk of acidosis.—B.M.J. i./11,1177 ; L. i./11,1277.

Sodium Bicarbonate used with the Salicylate probably counteracts the acid toxins (Formic Acid and probably also Acetic). 60 grains 10 times daily of Salicylate were given to a boy of 16 who had an enormous crop of rheumatic nodules, about 250 in all, with pericarditis, endocarditis, dilated heart and moderate arthritis. The maximum amount of 600 grains of Salicylate with 1,200 grains of Bicarbonate was given for two days. After this 500 grains Salicylate with 1,000 of Bicarbonate for 6 days for 3 weeks—the amount then gradually reduced. Every nodule disappeared, pericardial friction vanished and heart became smaller. Left hospital with merely a short presystolic and short systolic murmur at the apex. Prevent constipation and keep urine slightly alkaline.—D. Lees.

The itching of pruritus ani may be instantly relieved by the application of a very minute quantity of Sodium Salicylate.

Sedative anæsthetic action on the mucous membrane of the mouth, the pharynx and the gums—Pledgets of cotton wool soaked in sodium salicylate solution allay pain if applied to the cavity on extracting a tooth. A 4% solution is useful if applied to chapped hands, local defects of epidermis, sore nipples, and ulcerated chilblains.—Sem. Med. July 13/10, per M.A. 1911.

In typhoid suggested to give 3 to 5 grains in intestinal capsules.

Chorea believed to be always rheumatic, at least in part, therefore give Sodium Salicylate lest fresh rheumatic manifestations develop, which might thus be avoided. Smaller doses advocated than those of Lees (with Sodium Bicarbonate). Before starting treatment bowels should be freely opened, and before increasing dose evacuation should have taken place during preceding 12 hours. Chloretone as sedative sometimes useful in 3 to 5 grain doses.—F. Langmead, B.M.J. i./13,1262 ; L. ii./13,1755.

R. Stockman does not believe in the Salicylic treatment of chorea, but prefers Arsenic and nerve sedatives.—Pr. Jan. 1912.

Toxicity of Salicylates. Mean toxic dose for males of the synthetic Sodium Salicylate was 180 grains, for females 140 grains, of the natural Salt 200 and 135 grains respectively ; of Methyl Salicylate 120 minims alike for males and females, of Aspirin 165 and 120 grains respectively. The doses in arriving at these figures were given until symptoms of intoxication appeared.—P. J. Hanzlik, L. i./13,1811 ; Jl. A.M.A. March 29, 1913.

Salicylate treatment controls bacterial activity. Dose required usually 60 to 120 grains *p.d.* It should be given with this sole view—distinguish between symptoms directly due to and those depending on toxic parenchymatous changes which may remain long after bacterial activity has ceased.—R. Miller, L.i./15,175.

Excretion of Salicylic Acid. About 20 Cc. of a 10% Sodium Salicylate solution given hourly until toxic symptoms appeared—*i.e.*, after an average of 13·8 Gm. of Salicylic Acid had been taken. Fluid was then taken regularly until salicylic acid disappeared from the urine. The total excretion (60%) in acute

rheumatism was about 15% less than in normal persons (75%).—B.M.J. ii./17.296.

(A statement by Devrient, Arch. Exp. Path. Pharm., 1921,90, p. 242 (J.C.S.A. i. 21,909) is to the effect that not more than 15% of the acid administered is excreted in the urine.)

As an anti-diarrhœic, was used in the war. Men going within the hearing of big guns for the first time received 15 grain doses, preventing the otherwise involuntary motion.

Trench foot has been relieved by its use.

Sympathetic ophthalmia treated with Sodium Salicylate: large doses—one grain for each pound of body weight in the course of from 10 to 14 hours, *i.e.*, for patient of 140 pounds, seven doses of 20 grains are given at intervals of an hour and a half.—Jl. A.M.A., Sep. 11/20, 725, per Pres., Feb./21,74.

Tablets, 3 and 5 grains (**0·2 and 0·3 Gm.**).

Effervescent Sodium Salicylate. This is made in two strengths—5 and 10 grains in a drachm. *Dose.*—1 drachm (**4 Gm.**) or more.

* **'Vescettes' of Sodium Salicylate.** 5 grains. To be crushed and taken in a draught of warm water.

Nascent Sodium Salicylate Tablets contain Salicylic Acid equivalent to 5 grains of Sodium Salicylate plus an excess of Sodium Bicarbonate. Dissolve easily in water. In this form the irritating symptoms of the Salicylate are said to be reduced to a minimum.

Injectio Sodii Salicylatis. *Dose.*—15 to 30 minims (**1 to 2 Cc.**). 1 in 20 of sterile water or weaker. Is injected at the seat of the pain in rheumatism.

Intravenously, 1 Gm. doses have been given in rheumatic affections. The stimulation is more rapid than in doses *per os*.

Sterules of Sodium Salicylate, 15 grains (**1 Gm.**) in 320 minims (**20 Cc.**) and combined **with Sodium Iodide,** 1 Gm.

This combination, administered intravenously, has been found of advantage in chronic arthritic affections.

According to Connor (Med. Rec. vol. 85, 323, 1914), Hall (Med. Times, May, 1920), and others, the relief of pain in rheumatic affections is more prompt by giving Sodium Salicylate intravenously than by giving it *per os*. Salicylates are of great benefit in acute arthritis and this affection has been thought to be a symptom of streptococcal infection. Salicylates are of less curative effect in so-called chronic arthritis. The latter is no doubt a mixed infection. Where the infection is of a chronic nature, only a transient analgesic effect is produced by Sodium Salicylate, but the best (more permanent) results are to be obtained by using Sodium Iodide in addition.

Hæmorrhoids treated by interstitial injection of 30% Sodium Salicylate solution. Results as good as those obtained with Carbolic Acid (*vide* Hamamelis), but the pain immediately after the injection is more severe and lasts longer.—J. Dunbar, B.M.J. ii./23,809.

Mistura Sodii Salicylatis.

Dose.—1 ounce (**30 Cc.**).

Sodium Salicylate 10 grains, Aromatic Spirit of Ammonia ½ drachm, Belladonna Tincture 5 minims, Chloroform Water to 1 ounce. For a common cold every four hours.—Pr. Mar. 1911.

Sodium Di-Iodosalicylate, *Syn.*, **Diosal Solution,** 1 and 2% strength. A potent antiseptic, but not efficacious intravenously on local suppuration, as in wounds, but may be useful locally applied. It has however given relief in 3 Cc. doses intravenously in tuberculosis and rheumatic pains.—W. M. Crofton, L. i./23,893.

Acidum Acetyl-Salicylicum (*Off.*). Fr. Cx. P.G.V. P. Helv., P. Dan., Ph. Ital. IV. $CH_3CO.O.C_6H_4COOH = 180{\cdot}109$.

Aspirin.—Trade Marks No. 221673, registered in 1899 and No. 322523, registered in 1914 by a Limited Company in this country. Both these marks were removed from the Register ('avoided'), in 1915 under the provisions of the Patents, Designs and Trade Marks (Temporary Rules) Act, 1914.

The Name Aspirin is now *public property.*

The American Patent Office followed suit and held that the U.S.A. Trade Mark No. 32805/1899 is not a valid trade mark, and recommendation was made that it be cancelled.—C. & D., Feb. 1, 1919.

The following Associated Trade Marks are still on the British Register :—✱ Novaspirin, 322552; ✱ Aspirinoids, 322524; ✱ Novaspirinoids, 322553; ✱ Diaspirin, 322531.

Patents.—No. 27088 of 1898, "Manufacture or Production of Acetyl-Salicylic Acid," and No. 9123 of 1899. The first of these was declared invalid in 1905 (see C. & D., July 15, 1905, p. 81), the second lapsed through non-payment of fees in the eighth year. The German patent is 93110 (14/6/96). "Verfahren zur Darstellung von Salicylessigsaure" and was granted to Dr. Ludwig Limpach, Berlin. The second British patent deals with the use of condensing agents during the reaction. *See also Manufacture below.*

Riedel's method, Patent No. 11596/97, which became void in the seventh year "Process for the manufacture of Salicylic-acetic Acid," is of importance. It consists in causing **monochloracetates** to act on salts of salicylic nitril or salicylamide and saponifying the product.

Acetosal, Acetysal, ✱ Empirin (T.M. 364114), **✱ Genasprin** (T.M. 380162), **Helicon, Salacetin, ✱ Salaspin** (T.M. 363715), and **Saletin,** are further names for the substance.

Dose.—5 to 15 grains (**0·3 to 1 Gm.**), in cachets or suspended in a good draught of water thrice daily after meals—never on an empty stomach. Children ½ to 5 grains (**0·03 to 0·3 Gm.**) Ph. Ital. has 5 Gm. as max. dose in 24 hours.

Manufacture.—By action of acetic anhydride on Salicylic Acid. Salicylic Acid 50 and Acetic Anhydride 75 are heated to 150° C. for two hours under a reflux condenser. On cooling the crystals are pressed out and recrystallised from dry Chloroform. Alternatively Salicylic Acid 25 and Acetyl Chloride 20 are heated under a reflux condenser to 80° C. for some hours. Excess of Acetyl Chloride is removed on the water bath and the product recrystallised from dry Chloroform, Benzene or Carbon Tetrachloride.—P.J. ii./15,489,490. *Vide also Patents above.*

Characters.—A white powder M.pt. 133 to 135° C. Parry thinks the true M.pt. is nearer 136 –137°. There is good reason for believing that it is not an absolutely stable body—all samples have a more or less marked odor of Acetic Acid. ***Soluble*** about 1 in

400 of water. 1 in 5 alcohol 90%. Incomplete solubility is caused sometimes by the use of benzene as recrystallising medium.—Prof. H. Llewellyn Smith.—P.J. i./15,200.

Aspirin passes (in great measure) unchanged through the stomach decomposing to a great extent on reaching the alkaline intestinal juices (see work of Stockman, *infra*). ***Incompatible*** with free acids, iron salts and alkalis. It forms a clear mixture with Sodium Bicarbonate, owing to formation of Acetate and Salicylate of Sodium, and is not intended to be thus prescribed. Heating the acid in presence of moisture also causes dissociation.

Ferric Chloride added to Solution produces no violet colour; distinction from and absence of Salicylic Acid. For further details see Vol. II.

Flavoring.—Glyl Aurantii Amari, Glyl Vanillæ, Glyl Menthæ Piperitæ; Syrupus Pruni Virginianæ, Syrupus Tolutanus.

Uses.—Has anti-rheumatic properties, and is used as a substitute for Salicylic Acid and its salts. Does not irritate the mucous membrane of the stomach, and is to be preferred in heart and ear complaints. Is useful in influenza (especially with Quinine), acute and chronic affections of the joints, headaches, and in gout, neuralgia, chorea, and pleurisy. Has been used in hay fever, diabetes and dysmenorrhœa. The gradual hydrolysis of the substance in the body is said to prevent the cumulative toxic action of the Salicylic Acid. It relieves the pain of cancer and of cystitis.

In influenzal complaints a few doses during the day will often induce perspiration, quiet sleep follows, fever is reduced and pulse improves.

In some cases, it is useful with Caffeine, *e.g.*, Aceto-Salicylic Acid 7½ grains with Caffeine 3 grains.

Physiological Action.—Our experiments have shewn that in passing through the stomach Acetyl-Salicylic Acid splits up to an extent not exceeding 5% of the amount taken, the bulk of the acid being absorbed as salicylate in the intestines after hydrolysis.

Prof. H. Llewellyn Smith has gone over similar ground with numerous commercial samples and confirms our results.—P.J. i./15,200.

Elimination of Salicylic Acid and of unchanged Aspirin. A paper by P. J. Hanzlik and E. Presho in the Journal of Pharmacology and Experimental Therapeutics, May 1923, embodying some results obtained *in vitro* and an investigation of the urine of 6 patients, 4 of them being convalescents and the remaining 2 suffering with rheumatic fever, is apparently written to upset existing beliefs as to the fate of Aspirin in passing through the system. So far as the *in vitro* experiments go, the results confirm our own investigations which have been published for some years, *i.e.*, the amount of decomposition depends on the time in solution at body temperature.

With regard to the clinical results, the total of Salicylic Acid and unchanged Aspirin, which was found to have been passed, varied considerably in the various cases, for example in one case, 68·5% of the total Salicylic Acid and Aspirin was excreted, while in another case only 27% was excreted. It should also be made clear that the dosage was heroic and, intentionally, bordering on the toxic. The paper says that with ordinary doses, ½ to 1 gram of Aspirin, no data are at hand, but that with doses of this magnitude the mean excretion of total Salicylic Acid in 3 normal individuals was about 60%.

The main point of the paper appears to be that in the 6 persons already referred to, *receiving toxic doses* of Aspirin, there was a total excretion of unchanged Aspirin ranging from 8·8% to 36·6% of the Aspirin taken, and, broadly speaking, that a considerable amount of unchanged Aspirin would circulate through the body in such cases. The investigation is of interest but the conditions do not seem to be in agreement with ordinary therapeutic developments.

For *further details, also for* ***Bactericidal Action*** *vide* Vol. II.

Mistura Acidi Acetyl-Salicylici. *Dose.*—½ ounce=10 grains. Acetyl Salicylic Acid in fine powder 10 grains, Tragacanth Mucilage 90 minims, Water to ½ ounce.

If it be desired to prescribe the acid in a mixture the above formula will serve, providing it is not kept too long, particularly in hot weather.

Tablets are prepared weighing 5 grains (**0·3 Gm.**), and 8 grains (**0·5 Gm.**). These should *not be swallowed whole.*

Also **Tablets of Acetyl-Salicylic Acid** 5 grains **with Phenacetin** 2½ grains each and [P] [D] **with Dover Powder** 2½ grains.

Acute febrile diseases—measles, pneumonia, diphtheria and sepsis generally—treated by the following combined: Aspirin 10 grains, Phenacetin 5 grains, Compound Ipecacuanha Powder 15 grains, with striking effects. Inflammation reduced at site of origin, with sweating and fall of temperature.—R. J. G. Parnell and co-workers, B.M.J. ii./22,1000. The combination is highly spoken of by others; valuable during the paroxysms of malaria. *ibid.*, p. 1097. *See also* L. ii./23,1422.

Aspirin and Phenoquin—combined powders 7½ grains each, followed in the morning by a brisk Saline aperient, useful. Better than Aspirin alone in producing a profuse perspiration.—N.Y.M.Jl., Mar./20, 459, per Pres., Feb./21,85.

Aspirin Tablets made with 1½ molecules of Sodium Bicarbonate to 1 molecule of Acid subject of a Patent.—P.J. i./13,768.

Elixir Sodii Brom-Acetosalicylatis.

Dose—½ ounce repeated each hour if necessary until 4 doses have been taken. Contains the equivalent of 10 grains of Acetyl-Salicylic Acid and 10 grains of Sodium Bromide in 1 ounce.

Antipyretic. Relieves chronic articular rheumatism, and may be tried for vague neuralgic pain.—W. W. W.

References to Acetyl-Salicylic Acid.

Acetyl-Salicylic Acid, Patent Case, P.J i./05,672,700.—Judgment P.J.ii /05,76, see also P.J. ii./07,424

Chorea,—the drug par excellence. Large doses (10 grains) four hourly to a child of six. Best given suspended and flavoured, *e.g.*, Aspirin 10, Gum Acacia *q.s.*, Syrup of Orange 30, Chloroform Water to 120. A dessertspoonful dose = 10 grains.—J. Allan, Pres. Feb. 1913,51.

Pneumonia in Southern India. Good results in eight cases—not of a rheumatic origin as acute rheumatism is unknown in the locality. Early stages 8 to 10 grain doses of Aspirin given. Respirations and pulse fell satisfactorily after crisis in each case.—L. i./13,786.

Acute nasal catarrh, prophylaxis of—Aspirin in 20 grain doses three times a day. Magical in the acute attacks.—B.M.J. ii./13,836.

Extensive syphilitic periostitis,—to relieve. Large doses of Acetyl-Salicylic Acid—3 to 4 Gm. p.d. for nine years—making a total of over 26 lbs. No by-effects providing bowels opened freely. On an empty stomach there was often pain—probably from the enhancing of the acidity. No ill effect even when combined with Mercury, Salvarsan, etc.—P.J i./13,150.

Glycosuria is occasionally reduced by.—W. Hale White, L. i./14,372.

When aspirin is placed dry on the tongue and washed down with water there is a slight feeling of local anæsthesia on the tongue, which we have attributed to nascent salicylic and acetic acids, the aspirin being immediately hydrolysed by moisture, and being ionic the acids are much more active. Some cases of gastric pain are immediately relieved by small doses of aspirin, and this relief may be due to the nascent aromatic acid.

Occasionally it is found that the normal acidity of the stomach is absent (a condition not infrequently associated with phthisis), and in such cases it is advised that a little hydrochloric acid or lemon-juice should be taken before the dose to overcome alkalinity in the stomach.—C.D. i./11,717.

For rheumatic pains in the arm 15 grains in three 5 grain doses during 4 to 5 hours. Within 20 minutes of the third dose marked œdema of the eyelids, forehead and cheeks suddenly developed. The œdema did not disappear until the third day, and rheumatic pain ceased. Another patient experienced similar effect—5 grains caused puffiness of the eyelids.—P. H. Abercrombie, B.M.J. i./11,1314.

Asthma. Some cases relieved by Aspirin. In others it is quite unsuited. —B.M.J.E. ii./22,33.

Toxic Effects.

May occasionally cause gastric pain, vomiting and giddiness; œdema of face and skin rash.

Cyanosis and rash after 10 grains of Aspirin—special idiosyncrasy.—W. A. E. Karunaratne.—B.M.J.ii./19, 42.

Patients with low blood pressure and nasal polypi cannot take Aspirin. Phenacetin is usually safe.—A. kransis, *ibid.* 204 *see* also *ibid.* 560 and 694.

Synthetic Acetyl-Salicylic Acid is apt to contain Ortho-Creosotic Acid as well as free Salicylic Acid.—Hastings W. Molloy, M.P.C., Nov, 22/22,429.

As a drug crave Aspirin may develop in the future.—Prof. Wild, L.ii./20,35

For further references see previous Edn., p. 89.

Calcii Aceto-salicylas. *Syn.* ✱ **Tylcalsin** (T.M. 337714). *Martindale.*—$(CH_3CO.O.C_6H_4.COO)_2Ca$ $(+2H_2O)=434{\cdot}304$.

✱ **Kalmopyrin** (T.M. 348371) has the same composition.

White amorphous, non-hygroscopic powder, the manufacture of which is protected by several patents, *e.g.*, No. 4986 of 1912.

Dose.—5 to 15 grains (**0·3 to 1·0 Gm.**). May be dissolved in a little water at the time of taking.

Solubility.—The compound is soluble in water 1 in 6, but it is liable to dissociation in this form. It is preferably given in Tablet, crushed at the time of taking, in water or as a cachet, followed by a draught of water.

Exposure to excessive temperatures.—It is important to note that Tylcalsin should not be subjected to heat, especially in association with moisture. We have made a number of experiments on the matter and may record that decomposition commences between 50° and 60° C., but even this should be avoided.—W.H.M., Oct./1921.

Incompatible with mineral acids and as other Lime Salts.

Serious drawbacks to the use of Acetyl-Salicylic Acid are its incompatibility with Sodium Bicarbonate and that it is insoluble in water and cannot be given in a mixture.—R. Stockman, B.M.J. i./13,599.

In the case of Tylcalsin experiments show that with a mixture containing 5% of the compound with 5% of Sodium Bicarbonate incompatibility occurs in that Calcium Carbonate is precipitated with evolution of CO_2, but the Sodium Aceto-Salicylate formed

remains as such for a period of at least 2 days, only a small proportion of it (about 6%) is split up—this is in fact no more than occurs with Tylcalsin in water alone. Prescription in mixture form is however *not advised.*

Tablets and **Cachets** 8 grains (**0·5 Gm.**) each are preferable.

Uses.—In view of its greater solubility, Tylcalsin forms a very useful substitute for Aspirin (Compare note under Accto-Salicylic Acid by Graham Chambers, Vol. II.—from which it is evident that Soluble Medicaments pass rapidly through into the intestine and are there absorbed).

It hydrolyses slightly in Solution—less than the Lithium Salt, but is rapidly split up on boiling in solution.

(Special attention is drawn to the *intravenous* use of Tylcalsin *infra.*)

A prompt remedy as an anti-rheumatic and influenza specific, in catarrhs and neuralgia and for general relief of pain. The response in these affections is excellent. It combines the good qualities both of Sodium Salicylate and Aspirin. No by-effects are produced on the heart, etc. It is well tolerated and has never been known to produce vomiting. A useful analgesic, veritably specific, for chronic rheumatic pains of the limbs.

Antipyretic action occurs in about an hour, with drop of temperature of 0·4 to 0·8° C.—the drop being maintained for 2 to 2½ hours, then give further dose—for rheumatic gout pain. As analgesic one tablet is often sufficient, two may be given if heart action normal.

In lumbago 2 Tablets at night in hot tea (as diaphoretic) valuable.

In neuralgia the writer (W. H. M.) had the following results. There had been bad bouts of neuralgia for a week or two consequent on some dental trouble. One day the neuralgia, which stretched from the ear to the chin, became intolerable. Treatment during the day was as follows :—8.30 a.m., Syr. Easton ; 9 a.m., Carbolic Lotion as mouthwash ; 10 a.m., Lin. A.B.C. all over side of face, Chloral cum Camphora rubbed into gums ; 2 p.m., Pil Butyl Chloral cum Gelseminina internally. Little relief all day—the pain at times was almost unbearable. 10 p.m. took 2 Tylcalsin Tablets. Soothed in half an hour. Pain ceased and permitted literary work until 1 a.m.

In gonorrhœal rheumatism, Tylcalsin has given excellent results.

Calcium Salicylates useful in obstinate diarrhœa—hence this new body may have further utility in this direction.

The advantage in Tylcalsin and Tyllithin over Aspirin is far greater solubility favouring rapidity of action.—B.M.J. i./13,1278.

It does not cause pharyngeal or gastric pain like the free acid and it occasions less renal irritation.—P.J i./17,419.

Asthma well treated by Tylcalsin, ten grains three or four times a day. Calcium Lactate used for children.—A. M. Bremner, B.M.J. ii./22,666.

Dengue has been well treated by Tylcalsin. In some cases relief commenced in half an hour.—R. B. Billimoria.

A case has been reported to us of a lady with a remarkable eye affection. The pain was so intense that it was only relieved by

three or four hypodermic injections of Pantopon per day. The eyes felt as though there was a " fire " inside (sclerotitis ?) with considerable epiphora. The eyelids were swollen so that they could not be opened. On forcing them open there was every appearance of panophthalmitis and the case was considered hopeless, but improvement was remarkable under Tylcalsin, Pilocarpine hypodermic injections weekly and a mixture of Sodium Salicylate, Potassium Iodide and Tincture of Cimicifuga.—F. St. John.

A further report says :—A case of septic throat (Staphylo. and Streptococca by examination) treated with success with Tylcalsin internally and Tinctura Ananassæ locally. In less than 24 hours the symptoms had completely disappeared. Tylcalsin acted well in checking the incubation of the Cocci and reducing temperature rapidly. For a septic throat, had never seen one give way so quickly —Craik Taylor.

TYLCALSIN ADMINISTERED INTRAVENOUSLY.

A useful therapeutic measure was recently tried and perfected, in the direction of relieving rheumatic and other types of pain—namely, the administration of Tylcalsin intravenously, by A. Cambell (M.O. i/c. Roy. Portsmouth Hosp.) B.M.J., ii./21,37. See also W. H. Martindale, *ibid.*,774.

Dose.—The usual dose is 0·5 to 1 Gm. in 10 to 20 Cc. of water, but larger doses, even 2 Gm., have been administered. The concentration is of importance ; it should not exceed 5%.

Technique. The contents of one Sterule are dissolved in 10 Cc. of previously boiled and cooled water, and injected slowly. Solutions of Tylcalsin must not be boiled.

Tylcalsin Sterules (containing the dry powder unaffected by atmospheric moisture) are prepared containing 0·5 and 1 Gm.

The method has been successful in a diversity of painful affections where other remedies have failed. Success, for example, has been obtained in sciatica, acute rheumatism, tabes dorsalis, interstitial keratitis, acute iritis, gonorrhœal synovitis, dysmenorrhœa and severe headaches of doubtful causation.

A case of psoriasis of 15 years standing was treated by the method, we are informed privately, with " marvellous " result. The affection cleared up completely.

The procedure is well worthy of trial in obstinate influenza cases.

TYLNATRIN INTRAVENOUSLY.

This, the analogous Sodium compound, has been used on exactly similar lines. Experiments *in vitro* showed that it was more readily miscible with blood serum without causing coagulation or precipitation, but clinically it does not appear to have the same good effect as the Calcium Salt, particularly in the sensory symptoms of tabes and in the relief of pain of iritis. Tylcalsin produces in 10 or 15 seconds flushing and sensation of heat and is more inclined to cause thrombosis, but its relief of pain was found to be quicker and more lasting.

Tylnatrin Sterules 0·5 and 1 Gm. (containing the dry powder for dissolving are prepared.

Granular Effervescent Tylcalsin contains 5 grains in the drachm.

Dose.—1 to 3 drachms.

Lithii Aceto-Salicylas $CH_3CO.O.C_6H_4COOLi = 186{\cdot}041$. *Syn.*, ***Tyllithin** (T.M. 337715). *Hydropyrin (T.M. 318592) is a similar compound.

Dose.—5 to 15 grains (**0·3 to 1 Gm.**). Maximum daily dose 75 grains (**5 Gm.**).

White powder with bitter taste. ***Soluble*** 1 in 1 (by experiment) in Water, 1 in 4 Alcohol (W. H. M.), insoluble in Ether. The salt is to be kept in a well closed bottle as it is slightly hygroscopic and undergoes decomposition in moist air. Its manufacture is protected by several patents.

Uses.—Analogous to those of the Calcium Salt above described. The Lithium body may be preferred by some practitioners but the effect of treatment are practically identical.

Hydrolysis of Tylcalsin and Tyllithin.—Experiments which we conducted in 1911—the outlines of which are given in Vol. II., showed that the amount of splitting up in the presence of Hydrochloric Acid of physiological strength, is practically identical in the case of the Calcium and Lithium Salts and the parent Acetyl-Salicylic Acid—amounting in fact to between 2 and 5% of the dose taken in 4½ hours. Hence the alkaline salts may be quite as useful in physiological action as the acid, and by reason of their greater solubility—in particular the Calcium Salt—should possess distinct advantage for prompt action.

Incompatible with Iron Salts, Mineral Acids and Alkalies.

R. Stockman draws attention to the fact that Acetyl-Salicylic Acid is incompatible with Sodium Bicarbonate, is insoluble in water, and cannot be given in a mixture.—B.M.J. i./13,599.

Experiments show that with a mixture of 5% each Tyllithin and Sodium Bicarbonate a very slight precipitate of Lithium compound forms with evolution of CO_2—Sodium Aceto-Salicylate being formed in solution. The Aceto-Salicylate radical remains undecomposed except to the extent of about 6·5% of it, which occurs in two days time. This is not more than in the case of Tyllithin alone in solution. It is preferably given as **Tyllithin Tablets** or **Cachets**, 8 grains (**0·5 Gm.**) in each. It is *not desirable* to prescribe Tyllithin in a mixture.

Granular Effervescent Tyllithin contains 5 grains in the drachm.

Dose.—1 to 3 drachms.

Tylcalsin 5 grains, Quinine Salicylate 1 grain, Salol 5 grains, and Phenalgin 10 grains, as a combined powder, has been found most efficient in neuritis and neuralgia.

Magnesii Aceto-Salicylas. *Syn.* ***Magisal.** (T.M. 413697) *Martindale.*

Dose.—5 to 15 grains (**0·3 to 1·0 Gm.**).

Made by stirring the acid for a considerable time in a little water

with Magnesium Oxide, Magnesium Hydroxide or Magnesium Carbonate, *e.g.*, Magnesium Oxide 40, Aceto-salicylic Acid 360, Water 180. When the reaction is complete the mixture is extracted with Alcohol and the Alcoholic solution precipitated with Ether.—(G. Richter, Patent No. 10,946 of 1914.)

Or by shaking the last mentioned quantities with ten times the amount of water stated, then adding Methyl Alcohol and precipitating the salt with Ether.

We have worked on this chemical and find it better to use Alcohol (90%) 1600 for above quantities without the use of any water, and to precipitate with Ether 6000 after filtering. If made this way the content of Salicylic Acid as impurity is only 0·2%, whilst with the water method it may exceed 3%.

Microcrystalline powder, non-hygroscopic, almost tasteless and odourless, soluble readily in water and in Methyl Alcohol, less in spirit.—P. ii./15,436; i./17,419.

Uses.—This is an interesting relatively stable Acetosalicylate which may be tried as an alternative to the other salts and the acid.

Saligenin.—$C_6H_4CH_2OH.OH = 124·099$.

Dose.—10 grains (**0·6 Gm.**).

Chemically this is the Alcohol of which Salicylic Acid is the corresponding acid. It is converted into the acid in the body.

In acute rheumatism it is well spoken of by R. Stockman,—the above dose every two hours. Action rapid. Pain in joints ceased in 12 hours and temperature normal in 36 hours. In another case the fibrous tissue was widely affected and 1,340 grains had to be given. It caused a good deal of perspiration, and two cases suffered from deafness.—B.M.J. i./13,598

Saligenin has local anæsthetic properties—the best of the phenyl carbinols. Much less toxic than Cocaine, Novocain and anæsthesia lasts quite as long. Minor operations under 2% solution. 4% solution useful in work on the female urethra and bladder.—J. Pharm. & Exp. Ther., June, '20, p. 261. J.A.M.A., Dec. 25, 1920, p. 1770, per Pres., Feb. '21, p. 41.

Acetyl methyl-Salicylate. *Syn.* SALACETOL.

$C_6H_4(OH).COO.CH_2CO.CH_3 = 194·13$.

Dose.—10 to 30 grains (**0·6 to 2 Gm.**) in cachets or suspended.

Manufacture.—By heating Sodium Salicylate with Monochlor-Acetone in equimolecular proportions, in shining crystals very slightly soluble in water in alcohol 90% 1 in 14 easily. Caustic alkalis decompose it forming salicylates.

Used in rheumatism. For diarrhœa best given in Castor Oil (if required)—before breakfast.

Salicinum. (*Off.*), U.S. $C_6H_{11}O_5.O.C_6H_4.CH_2OH = 286·209$.

Dose.—5 to 20 grains (**0·3 to 1·2 Gm.**) in aqueous solution, taste may be covered with liquid extract of liquorice, or small dose in pill with glycerin of tragacanth.

A glucoside in colourless shining trimetric tabular crystals, without odour, taste moderately bitter. ***Soluble*** 1 in 28 parts of cold water, less in alcohol, but not soluble in ether. Obtained commercially from *Salix fragilis* or *S. purpurea* and other species of willow. M.pt. 200° C.

Flavoring.—Syl Rosæ, Glyl Cinnamomi; Syrupus Aurantii, Elixir Saccharini.

Uses.—In small doses, often combined with valerianates and compound rhubarb pill, is a mild tonic. It is stated to cure influenza more rapidly than any other treatment, and to act as a prophylactic. In acute rheumatism, large doses are specific. It is given to reduce fevers, *e.g.*, of malaria or phthisis. Is of value in psoriasis and in syphilis where Mercury is not tolerated. It is not adapted for use as an external antiseptic.

Effervescent Salicin.

Dose.—1 drachm. Contains 5 grains in 1 drachm.

Tablets, 5 grains of Salicin (**0·3 Gm.**). *Dose.*—1 to 4.

Its action depends on production of Salicylic Acid in the blood. In rheumatic fever it is highly satisfactory. 20 grain doses hourly or 30 grains every 2 or 3 hours. 60 grains have been given repeated in 2 hours without ill effect.—R. Stockman,

In lupus erythematosus with good results, 15 grains 3 times a day with a saline aperient.—J. M. H. MacLeod, B.M.J. ii./13,313.

Influenza. Salicin, large doses effectual; 20 grains every hour for 12 hours followed by 20 grains every 2 hours for the next 12; also removes infectivity of patient.—E. B. Turner, B.M.J. ii./18, 112; i./19,278.

Salol (*Off.*). **Phenyl Salicylate** $C_6H_4.OH.COO.C_6H_5$=214·145.

Dose.—5 to 15 grains (**0·3 to 1 Gm.**) in cachets or suspended in milk. Fr. Cx. : *Max. single dose,* 15 grains. Max. during 24 hours, 90 grains.

Small crystals, with a slight wintergreen odour.

Tablets, 5 grains (**0·3 Gm.**). *Dose.*—1 to 3. **Pills** contain 2½ grains. **Capsules** contain 5 and 10 grains (**0·3 and 0·6 Gm.**).

Soluble 1 in 10 or more of alcohol, 1 in 12 of liquid paraffin, in fixed oils, and a trace in glycerin. Almost insoluble in water.

Dispensing Note.—When prescribed in an emulsion with an oil, *e.g.* Castor Oil, dissolve it in the oil before proceeding. Melt the Salol and the oil in a warmed mortar (salol melts about 42 to 43° C.); emulsify with tragacanth, using hot water to complete.

In the case of the following prescription, Salol 10 grains, Castor Oil 5 minims, Tragacanth Powder *q.s.*, Glycerin 10 minims and Water to one ounce, it is well to use Saponin. Place the Castor Oil, Salol and Glycerin in a mortar with half a grain of Saponin; triturate well together, then add gradually with continuous stirring half an ounce of mucilage of Tragacanth, and, finally, the requisite quantity of water. This method produces a fine, white non-separating emulsion.—A correspondent C.D., Sept. 9, 1922.

Flavoring.—Glyl Lavandulæ, Glyl Pini; Elixir Aromaticus, Syrupus Aurantii Floris.

Uses.—Antiseptic and antipyretic. In the small intestine it splits up into its component parts, both being found in the urine, which is rendered aseptic and becomes very dark. With success for rheumatism, acute and chronic, for sciatica, dysentery, and typhoid fever, gonorrhœa and vesical catarrh and diabetes. The dose is limited by its *phenol* content.—R. Stockman.

In all forms of sore throat, relieves earache and ocular neuralgia, and of value for summer diarrhœa, especially of children. Must not be given in renal disease.

In diagnosis of fermentative Indigestion :—

The time taken for the food to leave the stomach may be found by giving 15 grains of Salol. This does not undergo decomposition in acid, but in an alkaline medium is split up into constituents, phenol and salicylic acid. The presence of the latter is readily found in the urine by adding a little neutral Ferric Chloride solution. One may expect to find it normally in from 45 *to* 75 *minutes after Salol is taken.*—B.M.J. i./11,665.

Cachets of Salol, Bismuth Carbonate and Sodium Bicarbonate, 5 grains each are useful as intestinal antiseptic.

Salol Mouth Wash.

A preparation similar to Odol ; is produced by dissolving Salol 2·5, Saccharin 0·004, Peppermint Oil 0·5, in Alcohol 80%, 97 by weight, and adding Clove and Caraway Oil.—Y.B.P. 1902,284. *For use* dilute in proportion ½ to 1 teaspoonful to the ½ pint of warm water.

Emulsio Salol. *Dose.*—½ to 1 ounce.

Salol 20 grains, Compound Tragacanth Powder 20 grains, Distilled Water *q.s.* to 1 ounce.

In the treatment of cholera during the algide stage the following mixtures have been used :—Salol 10 grains, Mucilage 1 drachm, Spirit of Chloroform 15 minims, Water 1 ounce—every 2 hours until reaction sets in—then Sodium Bicarbonate 10 grains, Spirit of Chloroform 20 minims, Sweet Spirits of Nitre 20 minims, Water to 2 drachms, every four hours till urinary secretion is established and normal. Cox combines with this 2 or 3 quart intravenous injections of warm Sodium Chloride Solution (100 grains to the quart). This injection is made by gravity (2 or 3 feet head of water), and may be repeated. —Brooke.

Salol in dusting powders, tooth powders, lotions, pomades, etc., is held by some to possibly produce eczematous skin eruptions. Small particles of Salol, *e.g.*, in a tooth powder may be more irritant than a solution would be —P.R. Oct. 1913 ; P.J. ii./13,602

Salol Coating of Pills is conducted by employing Salol *melted.*

This renders the pill insoluble in the acid gastric juice, but soluble in the alkaline fluid of the intestine ; hence suitable for purgatives to act on the bowels, and for administering antiseptic remedies in cases of eczema and urticaria, when these are caused by intoxication from ptomaines in the intestinal canal. *cf.* Our experiments under **Pilulæ.**

Collodium Salol. Salol 4, Ether 4, Collodion 30. Gives rapid relief in pain of acute rheumatism.

Salol Catheter Oil. Salol 1, Castor Oil and Almond Oil, of each 15. Does not dissolve the varnish of catheters (G. Buckston Browne).

Salol cum Camphora, Salol Camphor.

Salol 3, Camphor 2, heated together combine to form a viscid liquid, which has been used as an antiseptic in place of iodoform. Prepared with 10% only of camphor, quickly crystallizes, and when powdered is suitable for application, where liquid not practicable.

Useful in suppuration of the middle ear ; non-irritating.

Liquefaction of mixtures of salol with other substances —Am. Jl. Ph. May, 1910, 241.

℞ Unguentum Salol cum Cocaina.

Salol 2, Cocaine Hydrochloride 1, Ceratum Petrolei 16. Useful for burns.

Unguentum Salol cum Menthol.

Salol 4, Menthol 2, Olive Oil 4, Anhydrous Lanolin to 100. For fissures of the skin, *e.g.*, in chapped hands.—Pres. 1913,260. Slightly modified.

Phenyl-Acetyl Salicylate. *Syn.* VESIPYRINE, ACETYL-SALOL, PHENYL-ASPIRIN $C_6H_4.O.CH_3CO.COO.C_6H_5$=256·171.

Dose.—15 grains (**1 Gm.**) thrice daily. Much larger doses have been given. Crystals insoluble in water. Soluble in alcohol. Uses as for salol and salicylates. Breaks up in the intestine into salol and acetic acid.—F.N., 1909.

* **Aspriodine** (T.M. No. 435198). *Syn.* ACETYL-IODO-SALICYLIC ACID.

$$C_6H_3I\begin{cases}O.CH_3CO.\\COOH\end{cases} = 306{\cdot}021.$$

Dose.—5 grains (**0·3 Gm.**) per diem after food may be regarded as efficient. The dosage may, if required, be carefully increased. To be given *alone* in tablet (crushed) or in cachet or slipule (No. 1), followed by a little water.

Chemical Composition.—Aspriodine is a definite compound containing 41·47% *Iodine*, the balance (58·53%) being the *Aspirin* radical. It is stable at ordinary atmospheric temperatures. It has M.pt. 154°.

Soluble in Alcohol 90% 1 in 16·5, Ether 1 in 22, Chloroform 1 in 57, very slightly in Water (1 in 5,500).

Incompatible with Alkalis. It is preferably administered alone.

Pharmacology.—Aspriodine embodies the properties of Iodides on the one hand and Aspirin on the other. It is not affected by physiological acid, but it is readily split up by the alkalinity of the intestinal digestive tract.

Evidence of liberation of Iodine in the body. Examinations of the urine after taking, for example, 10 grain doses of Aspriodine by the mouth have shown that the Iodine is promptly liberated in the system—within an hour. The Iodine in these instances is associated with inorganic bases, Sodium or Potassium. The result is of peculiar interest, because Iodine in the Benzene ring of an aromatic compound is generally strongly held and difficult to remove chemically, for example, by simply treating it with an aqueous solution of an alkali. We repeat there is therefore, distinct evidence that the compound is dissociated, possibly in part by enzyme action, in the alkaline portion of the duodenum.

Method Employed in Testing the Urine. Possible confusion with Iodine in the organic condition was excluded by treating the specimens with Ether after acidifying with Acetic Acid to remove any compound of the nature of Iodo-Salicylic Acid, which, it is assumed, would be formed in the first stage of dissociation. The procedure employed was to acidify a small amount, *e.g.*, 30 Cc., of the urine from the total output and extract it with Ether, as stated, by repeated shaking, then to render alkaline with Caustic Soda, evaporate to dryness and incinerate. The residue was dissolved in 10 Cc. of water and, after filtering, a small quantity of Sodium Nitrite and Sulphuric Acid were added in the presence of a little Chloroform. The Iodine passed into the Chloroform with the customary colour. (This method is preferable to the use of Chlorine Water.)

It is of interest to remark that a rheumatic sufferer had to take 10 grains 3 times a day after meals for 3 days before the Iodine was found in his urine, whilst a normal individual gave evidence of Iodine, as stated, in an hour after taking the dose.

It is noticed also that the urine of some individuals becomes promptly cloudy owing to an increased elimination of Uric Acid. The point is of value from the clinical aspect to those who still hold to the Uric Acid theory of rheumatic affections.—W.H.M. by experiments on himself.

Uses.—Small continued doses are suggested for treatment of rheumatic affections and in arteriosclerosis.

Aspriodine may also prove of service in asthma and in many other affections, where Iodides have proved beneficial, *e.g.*, in scrofula and for enlarged glands and wherever small continued doses of the two constituents are desired.

Broadly speaking, the substance has pronounced antiseptic powers —an important factor because Aspriodine is readily tolerated.

Aspriodine Tablets, Cachets and Slipules 5 grains (**0·3 Gm.**) are prepared.

Sodium-Aspriodine, Lithium-Aspriodine, Calcium-Aspriodine and **Magnesium-Aspriodine** have been prepared. These are also definite stable bodies which are new to medicine.

***Sedasprin** (T.M. No. 435197). *Syn.* ACETYL-BROMO-SALICYLIC ACID.

$$C_6H_3Br\begin{cases}O.CH_3CO.\\COOH.\end{cases} = 259{\cdot}021.$$

Dose.—Clinical trials, so far, have indicated a dose of 5 to 10 grains, as affording a mild sedative effect. The dose should be given preferably alone in tablet (crushed), slipule (No. 1 for 5 grains), or cachet form, with water. Sedasprin should be taken in reason—occasionally ; the remark applies to all hypnotics.

Chemical Composition.—Sedasprin is a definite compound, containing 30·86% *Bromine*, the balance (69·14%) being the *Aspirin* radical. It was apparently first made by Robertson (J.C.S.T. 81, [1902], p. 1482), but it has not been used medicinally until introduced by the author (1923). In common with Aspriodine, this Bromine analogue is stable at ordinary temperatures. It has M.pt. 136° C.

Soluble in Chloroform 1 in 11·5, Ether 1 in 4, slightly in Benzol, in Absolute Alcohol 1 in 10 ; in Alcohol 90% 1 in 4 ; slightly in water (1 in 1500).

Incompatible with alkalis. It is best given uncombined with other medicaments.

Pharmacology and Uses.—Pharmacologically the process of absorption of Sedasprin is analogous with that of Aspriodine (see note on ' Liberation of Bromine in the System,' *infra*). A remedy embodying the acknowledged anti-rheumatic, anti-neuralgic and febrifuge properties of Aspirin, with the sedative and hypnotic powers of a Bromide, should be of importance.

It has been suggested for use in all forms of nerve trouble, many types of headache, dysmenorrhœa, asthma, chorea, epilepsy, fevers, influenza, insomnia, laryngitis, neuralgia, sea-sickness and tonsilitis; in general, in cases where the combined qualities of Aspirin and Bromide are indicated. In chronic bronchitis, given at night as required, it has given relief.

Sedasprin Tablets, Cachets and **Slipules,** 5 grains (**0·3 Gm.**), are prepared.

Sodium-Sedasprin, Lithium-Sedasprin, Calcium-Sedasprin and **Magnesium-Sedasprin** have in addition been made. They are definite compounds, new to medicine.

Liberation of Bromine from Sedasprin in the System.

Although in the case of Aspriodine, inorganically combined Iodine can readily be shown in the urine shortly after taking a small dose of the compound, the demonstration of Bromine after taking a dose of the Bromine analogue is, according to some experiments undertaken by the author's assistants, not so easy a matter.

It is known that even in the case of examination of the urine and fæces, subsequent to taking a dose of Potassium or Sodium Bromide, the elimination is very slow. (Note the almost complete and remarkable absence of Bromine from the urine in the carefully conducted control investigations detailed below.)

Although we failed to demonstrate Bromine in the urine of an individual after taking Sedasprin, inorganically combined Bromine was found in the fæces, and there was evidence also of a small amount of organically combined (? Bromo-Salicylic Acid). The amount was quite insufficient to estimate with accuracy. The assumption is that the halogen in the compound Sedasprin is split off on lines similar to those occurring on assimilation of Aspriodine. Clinically the effect of Sedasprin is entirely distinct from that of plain Aspirin.

Bearing on the subject, one may add that most divergent statements are found in the literature. Hanzlik, *e.g.*, found that 40% of a dose of Salicylic Acid, taken by a normal person was excreted in 24 hours.—B.M.J. i./22,233.

Devrient (Arch. Exp. Path. Pharm. 1921,90, p. 242) says that not more than 15% of a dose of Salicylic Acid administered is excreted in the urine.

Hanzlik, Scott and Thoburn, B.M.J. ii./17,296, found 75% excreted by normal persons under certain conditions and so on.

The problem we were more concerned with, was relative to Bromine excretion in an instance of this nature. Here again there is relatively little authentic information available. The following data obtained in the author's laboratory will be of use:—

CHEMICAL NOTE ON THE DETECTION OF BROMINE EXCRETED IN THE URINE AFTER TAKING VARIOUS BROMO-COMPOUNDS.

Chlorine Water Test.—A few drops of fresh Chlorine water were added to 10 Cc. of the aqueous solution of the Bromide and this was shaken with 5 Cc. of colourless Carbon Disulphide.

Potassium Bromide, equivalent to 1 mgr. of Bromine, gave a distinct brownish-yellow tint; ½ mgr. of Bromine gave a pale yellow tint.

Under the above conditions of applying the test, smaller quantities than ½ mgr. could not be detected with certainty.

A few drops of Chlorine Water are usually sufficient; if a considerable quantity is used a greenish-yellow tint in the Carbon Disulphide is formed, liable to be confused with minute amounts of Bromine.

Carbon Disulphide appears to be the best solvent to employ—Chloroform, for example, used instead of Carbon Disulphide, does not show 1 mgr. of Bromine in the above test.

With dilution of the aqueous liquid the test became less sensitive. A positive reaction was however obtained with 1 mgr. of Bromine in 100 Cc. of water.

Test for Bromine in Urine.—By applying the test directly to urine, no reaction was obtained, even when 10 Cc. contained several milligrammes of Bromine. The following method was therefore elaborated :—

The urine was made alkaline with Caustic Soda, evaporated to dryness and incinerated at a low temperature. The mass was extracted with about 10 Cc. and 4 Cc. of water filtered, acidified, and the Chlorine Water test applied. Usually the whole of the urine was treated in this way. By this method Potassium Bromide, equivalent to 5 mgr. of Bromine in 100 Cc. of normal urine, gave a distinct brownish colour to the Carbon Disulphide, while a positive reaction was obtained with 1 mgr. of Bromine in 50 Cc. of urine.

The figures given below for the quantity of Bromine found in urine were obtained by very approximate calorimetric comparisons of the Carbon Disulphide solutions with others obtained from a known amount of Bromide.

Dimethyl-para-phenylene-diamine Test for Bromine in Urine. (Physiology and Pathology of Urine, Dixon Mann, p. 232).—This test did not indicate with certainty small quantities of Bromine. The violet colour produced was apparently due to oxidation, being also obtained on exposure of the paper or solution to the air.

Potassium Bromide.

Case I. [5 grains (0·3 Gm.)=218 mgr. of Bromine].

5 grains were taken at night. The urine passed in the morning contained about 2 mgr. of Bromine, while the third quantity—16 hours after taking Potassium Bromide—was free from Bromine.

Case II. [10 grains (0·6 Gm.)=435 mgr. of Bromine].

10 grains were taken at night, by a different person, the following results being obtained :—

Urine Passed.	Reaction for Bromine.
In the evening	No trace of Bromine found.
During first day	About 3–4 mgr. found in all the urine.
After 36 hours	About 2 mgr. found in urine.
40 hours after taking ..	About 1 mgr. found.
60 hours after taking ..	Only a very slight reaction.

In each separate quantity (varying from 250 to 500 Cc.) of urine examined only 2 to 3 mgr. or less of Bromine was found. This means that during the 2½ days probably only about 20 mgr. of Bromine (5% of the amount taken) was excreted in the urine.

Adalin.—[15 grains (1 Gm.)=0·328 Gm. of Bromine].

The urine was shaken several times with Chloroform to remove any unchanged Adalin, but this would possibly not eliminate Diethyl-bromo-acetic Acid—a likely product of hydrolysis.

15 grains (1 Gm.) were taken at night. The urine passed in the morning was free from Bromine but the third quantity examined (20 hours after taking) contained about 3 mgr. of Bromine. This may, however, have been present as $(C_2H_5)_2$.C.Br.COOH.

Adalin is evidently not expected to split up since—"though containing Bromine, its action is attributed to the molecule as a whole."

Sedasprin.—[10 grains (0·6 Gm.)=200 mgr. of Bromine].

After evaporation the urine was acidified and extracted with Ether several times to remove any Bromo-salicylic Acid and the test applied for inorganic bromide, but the results were negative.

In view of the fact that so little is found after 5 grains of Potassium Bromide—an almost equivalent dose in Bromine content—this is not altogether surprising.

The next step in the investigation was to examine the fæces after taking a dose of the compound. Small quantities of inorganically combined Bromine were found with apparently some Bromo-Salicylic Acid—insufficient to estimate.

The results are of course negative evidence that the Bromine is *absorbed*. It passes in such instances into the blood and thence to the nervous system.

Phenyl-Aspriodine. *Syn.* ACETYL-IODO-SALOL.
(**The name Aspriodine is a Registered Trade Mark*).

$$C_6H_3I\begin{cases}O.OC.CH_3\\ \\ COO.C_6H_5\end{cases} = 382{\cdot}083$$

Dose.—5 grains (**0·3 Gm.**) in tablet (crushed), cachet or slipule, with a little water. The dose may be cautiously increased. It should be given *as such*, not admixed with other chemicals.

This body, which is new to medicine, is the outcome of further work by the author on compounds of the nature of halogenised Aspirin. The Salol principle (Nencki) is involved in Phenyl Aspriodine. The ester passes unaltered through the stomach, to be split up by the alkalinity and saponifying enzymes of the intestines. The constituents are then slowly absorbed.

The compound is obtained as a white, crystalline powder of neutral reaction containing 33·22% of Iodine. The phenyl radical in it is equivalent to 24·6% approximately of Phenol. It is a stable body giving practically no colour with Ferric Chloride. It has M.pt. 123° C.

Soluble in Chloroform 1 in 3, in Alcohol 90% 1 in 250. Insoluble in water.

Pharmacology and Uses.—Phenyl-Aspriodine embodies the therapeutic effects of Iodine, Aspirin and Phenol. It is resistant to physiological acid but split up in presence of physiological alkali at body temperature. The dose of the substance is, in great measure, dependent on the Phenol content. This should be borne in mind, to prevent too potent effect.

In some instances its use should supersede Salol just as Phenyl-Aspirin should supersede Phenyl-Salicylate. There is further in this compound a content of 33·2% Iodine to enhance the antiseptic power.

The special claim of this drug is as an intestinal and urinary antiseptic. In 5 grain doses it causes slight darkening of the urine. Phenyl-Aspriodine may prove effective in typhoid and in dysentery and gonorrhœa. It should further be tried in rheumatic affections, neuralgia and in arteriosclerosis. ***Contraindication.***—It should not be given where the kidneys are affected.

Phenyl-Aspriodine Tablets, Cachets and Slipules, 5 grains (**0·3 Gm.**) each are prepared. No. 1 slipule holds 5 grains.

Phenyl-Sedasprin. *Syn.* ACETYL-BROMO-SALOL.
(**The name Sedasprin is a Registered Trade Mark.*)

$$C_6H_3Br.\begin{cases}O.OC.CH_3\\ \\ COO.C_6H_5\end{cases} = 335{\cdot}083.$$

Dose.—5 grains (**0·3 Gm.**) carefully increased if desired. It is preferably given *as such* in tablet (previously crushed) or in cachet or slipule (No. 1 holds 5 grains), with a little water.

This compound is the Bromine analogue of Phenyl-Aspriodine. It introduces the Salol principle in medicine to the halogenised Aspirins, which have already been considerably tried in treatment.

Phenyl-Sedasprin is in white crystalline masses of neutral reaction containing 23·85% Bromine. The phenyl radical present is equivalent to 28% approximately of Phenol. It is stable at ordinary temperatures and gives practically no colour with Ferric Chloride (absence of Salicylic Acid and Bromo-Salol.) It has M.pt. 118° C.

Soluble in Chloroform 1 in 3, in Alcohol 90% 1 in 380. Insoluble in water.

Pharmacology and Uses.—Phenyl-Sedasprin embodies the activities of Bromine, Aspirin and Phenol. It resists physiological acid but readily splits up in presence of physiological alkali at body temperature. Care should be taken to avoid over-dosage. The dose is limited to the equivalent content of Phenol. The compound should possess advantages over ordinary Salol as an antiseptic and antipyretic. It has especially antiseptic action on the urine, which is slightly *darkened in colour* after a dose of 5 grains. It is advanced for treatment of rheumatic affections, neuralgia, fevers, tonsillitis, laryngitis and particularly as a bactericide with sedative effect in urinary affections.

Contraindication.—It should not be given in renal disease.

Phenyl-Sedasprin Tablets, Cachets and Slipules, 5 grains (**0·3 Gm.**) each, are prepared.

Acetyl-para-amido-Salol. ✱ **Salophen.** P. Belg., Helv., Svec.
C_6H_4 OH.COO.C_6H_4NH.COCH$_3$=271·187.

Trade Mark 322560.

Patent 11,833/1891 and 3435/1892, both now lapsed.

According to the first patent, Nitrophenyl Salicylate (Nitro-Salol) (*cf.* German Patent 43,713/1887) is reduced with Tin and Hydrochloric Acid. The Amido compound is then acetylated with Acetyl Chloride or Acetic Anhydride. The second patent starts with Acetyl-*p*-Amidophenol (Berichte XI. p. 232).

The use of tin in our experience for reduction is bad—it is difficult to remove, and the use of Hydrogen Sulphide is unsatisfactory in general. Nitro-Salol would be made on the same lines as Salol (condensation of the Sodium Compounds of Salicylic Acid and Phenol), excepting that Para-Nitro-Phenol would be used. Phosphorous Oxychloride or Carbon Oxychloride would be employed to take up the Sodium. We have as yet had no actual experience in making the compound. See also R. Q. Brewster, Y.B.P. 1919, 130.

Dose.—10 to 15 grains (**0·6 to 1 Gm.**) 3 or 4 times a day in cachets. **Tablets,** 5 grains, are prepared.

White crystalline scales, tasteless; soluble in alcohol, ether, and alkalis, almost insoluble in water. It contains about 50% salicylic acid. ***Incompatible*** with Alkalis and their carbonates. It is unaffected by gastric juice, but decomposed by pancreatic ferment. Anti-febrile and anti-rheumatic. Used in chorea, neuralgia, sciatica, headache, and throat affections. Ointment 10% in Lanolin for psoriasis and other skin affections.

ACIDUM STEARICUM, U.S., P.Jap.

Stearinum, P. Austr. *Commercial Syn.* "STEARINE' wrongly so called. $C_{17}H_{35}COOH$=284·378.

This monobasic acid occurs as a hard white solid substance and is not entirely pure. It is prepared by decomposition with superheated steam of Stearin (the triglyceride of stearic acid contained with those of palmitic and oleic acids in tallow). ***Soluble*** about 1 in 18 of alcohol 90%. Readily soluble in ether.

Melts at about 56° C. (132 8° F.), (U.S.). This melting point corresponds to a mixture of 40% stearic acid and 60% palmitic. A melting point of 58° C. (136·4° F.) would be better for some suppositories. *Vide* Glycerin.

It is obtainable commercially with melting points 50° C. (122° F.), 52·5° C. (126° F.), and 56° (132·8° F.).

Commercially it contains 20 to 30% oleic acid. Iodine No. 21·7 would indicate about 24%. Pure stearic acid would of course have Iodine No. *nil*, which condition of purity is approached by successive re-crystallisations from alcohol.

Cocoa-nut Stearine.—A white firm fat melting at 84° F. (29° C.) suggested for use as suppository basis as having a melting point somewhat lower than cacao butter, which softens at 80° F. (26·6° C.), and melts between 88° F. and 93° F. (31·1° and 33·9° C.).

It is obtained by chilling and pressing **Oil of Coconut** (Cocoa-nut Oil or Cocoa-nut Butter, **Oleum Cocos** P.G. ii.) *i.e.*, the oil or butter from the *Cocoanut Palm, Cocos Nucifera* Linné, hence to be distinguished from the product called Cocoa Butter (Oleum Theobromatis *q.v.*). Oil of cocoanut is solid between 40° and 50° F., and liquid at about 80° F., and has characteristic odour. It is used as a substitute for lard and largely in soap manufacture. The dried pulp of the Cocoanut is known as **Copra.** The endocarp or meat of the nut is said to be a powerful tænicide. The patient should drink the milk and then eat the flesh of the nut.—U.S.D.

Cocoa-nut Oil has usually very low Iodine number—about 8. The oil from the *rind*, however. gives as high as 25 or 40.

Cocoa-nut Oil Soap. This, according to Lewkowitsch (quoted in Thorpe's Dictionary), can be prepared by a simple cold process, not requiring anything in the nature of boiling. To the fat previously warmed to about 35° C., an accurately measured quantity of Caustic Soda Sp. Gr. 1·35 (*i.e.*, 32%) is added with stirring. (Use approx. 2¼ of this lye to 5 of Oil. This will saponify with slight heating. A 'cold' process in our experience does *not* work on the small scale.—W.H.M.) The mass is allowed to stand and becomes warm, and saponification is effected in 24 hours. The soap is not "salted out," that is, it contains the Glycerin formed.

For making a COCOA-NUT SHAMPOO the following is suggested :—

Dissolve Sodium Hydroxide and Potassium Hydroxide, of each 1 part, in 5 parts of Distlilled Water and when cold add spirit 5 parts; melt Cocoa-nut Oil 10 parts, and when this is nearly cooled to the congealing point add t gradually to the alkaline solution with shaking. Continue shaking occasionally for 10 to 20 minutes; finally add water enough to make 50. The preparation is alkaline, and can be neutralised with a little Oleic Acid. Terpineol and Coumarin are suitable perfumes.— C. & D. Oct./1920, p. 1426.

Further Suggestions are :

COCOA-NUT SHAMPOO. Heat Cocoa-nut Oil soap 2 ounces with Glycerin 1 ounce and water 7 ounces on the water bath to dissolve, allow to deposit and add Oil of Bay 5 drops.

COCOA-NUT OIL SOAP FOR THE LAST MENTIONED. Dissolve Potassium Hydroxide and Sodium Hydroxide of each 20 Gm. in distilled water 50 Cc. and mix intimately with Cocoa-nut Oil (liquefied) 200 Gm. Allow to stand in a warm place 24 hours. If proportions correct a hard white near neutral soap is formed.—C.D. January 7/22, p. 12. See also P.J. ii./21, 407. We may add that, according to theory, 5½ parts of Oil require 1 part, in round figures, of Caustic Soda.

ACIDUM SUCCINICUM. P. SVEC.

$C_2H_4.COOH.COOH = 118{\cdot}068$.

Dose.—5 to 10 grains (**0·3 to 0·6 Gm.**).

Occurs on destructive distillation of Amber, as the oxidation product of a number of substances rich in carbon, *e.g.*, fats and fatty acids—treated with Nitric Acid. Also by fermentation of Malic Acid (Calcium Salt)—Liebig, or of Tartaric Acid, which is Dihydroxy-Succinic Acid.

Colourless crystals ***Soluble*** in Water 1 in 20, in Alcohol 1 in 9. Used chiefly as—

Ammonii Succinas.—$C_2H_4(COONH_4)_2 = 152{\cdot}132$.

Dose.—2 to 5 grains (**0·12 to 0·3 Gm.**).

Crystalline salt soluble in water and alcohol.

In spasmodic pains, particularly spastic contractions of the uterus.

Sodii Succinas.—$C_2H_4(COONa)_2 + 6H_2O = 270{\cdot}148$. In dose as above in catarrhal jaundice. Soluble 1 in less than 1·5 water. Has also been given in delirium tremens.—M.Am.

Potassii Succinas. $C_2H_4(COOK)_2 + 3H_2O = 248{\cdot}30$.

A deliquescent powder; has been used in doses of 5 to 10 grains to control hæmorrhage. **Ferri Succinas.** Ferric Succinate, a reddish-brown insoluble powder, removes biliary calculi and relieves hepatic colic.

ACIDUM SULPHURICUM.

Syn. OIL OF VITRIOL. $H_2SO_4 = 98{\cdot}076$.

'Poisonous.—Not to be taken.'—For further conditions of sale v. p. 48. *Dose.*—1 to 2 minims (**0·06 to 0·12 Cc.**).

With Sp. Gr. 1·843 contains 98% by weight of hydrogen sulphate. *Off.*,—Sp. Gr. 1·841 *i.e.* 95%.

"Contact Process" of manufacture. A mixture of Sulphur Dioxide and Oxygen is passed over finely divided Platinum or Oxide of Iron which acts as catalytic agent, causing union of the gases. By dissolving the Sulphur Trioxide thus formed in water, Sulphuric Acid is obtained.

Use.—Very occasionally as caustic.

Pruritus has been treated by internal use of, even when alkalinuria is absent. Dose, 1 tablespoonful every 2 hours of 1½ to 2½% solution. The itching is said to rapidly disappear.

Antidotes.—Magnesia and *cf.* Acidum Hydrochloricum.

Sulphuric Acid "Arsenic-free" is specially prepared to stand the Marsh-Berzelius Test 1 hour.

Acidum Sulphuricum Aromaticum (*Off.*). *Syn.* ELIXIR OF VITRIOL. *Dose.*—5 to 20 minims (**0·3 to 1·2 Cc.**).

This contains a small amount of (aromatic) ethylsulphuric acid. The preparation would be improved by carefully heating the mixture

of acid and alcohol to encourage the formation of the vinous acid. Contains 12·9% *w/v.* of hydrogen sulphate, and has Sp. Gr. 0·917 to 0·923.

Figures showing progressive decrease in acidity of this preparation. At end of one year the acid had lost 14·68% of its acidity.—H. C. Walker, P.J. i./21,130.

U.S. has sulphuric acid (93 to 95%) 109, Tincture of Ginger (1 in 5 alcohol 94·9% by volume) 50, Oil of Cinnamon 1, Alcohol (94·9%) to 1,000.

Acidum Sulphuricum Dilutum. (*Off.*). Sp. Gr. 1·069.

Dose.—5 to 20 minims (**0·3 to 1·2 Cc.**).

Contains 10% as also U.S., Fr. Cx., F. Norsk. and P. Helv. Ph. Ned. is quadrinormal.

Carbuncles, boils, staphylococcic infections and certain streptococcic infections well treated by internal use of Dilute Sulphuric Acid—20 to 30 minim doses with 2 ounces of water every 4 hours (small doses in carbuncle are no use). Externally 1 in 20 Carbolised Vaseline. Cases of bronchiectasis and pulmonary tuberculosis where there is often a staphylococcic infection also benefited. Sputum becomes less purulent and much less in quantity, and in tuberculous cases fluctuations of temperature are less.—L. i./13,749. As prophylactic and treatment in puerperal fever—see Therap. Ind.

Also effective in a case of severe acne and in a case of abscesses on the arms due to use of septic Morphine Solution.—L. i./13,562,643.

Incompatible with alkalis and carbonates. It precipitates barium and calcium from solutions of their salts, also soluble lead and silver salts.

Acidum Sulphuricum Fumans. *Syn.* Nordhausen Sulphuric Acid or "**Oleum,**" Sp. Gr. about 1·9. Contains some sulphuric anhydride dissolved in sulphuric acid. Manufactured by distillation of dried Ferrous Sulphate in stoneware retorts. Ferric Oxide or **Colcothar** or **Polishing Rouge** remains behind. The formula $H_2S_2O_7$, *i.e.* $H_2SO_4 + SO_3$ contains about 45% SO_3. Commercially the range of SO_3 content is from 10% to 40%.

ACIDUM SULPHUROSUM.

H_2SO_3=82·076 ; SO_2=64·06.

Dose.—½ to 1 drachm (**2 to 4 Cc.**).

A colourless liquid, with strong sulphurous odour, and containing *Off.*, 5% of SO_2. Sp. Gr. 1·025.

Preparation.—By roasting sulphur or by heating copper and sulphuric acid, or carbon and sulphuric acid.

Uses.—This solution of Sulphurous acid is applied externally as a lotion—one part to two or more of water and sometimes a little glycerin added—for parasitic affections such as chloasma, ringworm, pruritus, thrush, and chapped hands, with very good results. It is sprayed into the throat for tonsillitis, diphtheria (better diluted) and asthma, or used as an inhalation, a teaspoonful to a pint of cold water. It is strongly antiseptic, and has been used in whooping cough by fumigating the room. Also diluted, for fœtor of the teeth, *e.g.* in syphilis.

Internally it has been used in cholera (freely diluted). As a rectal injection, a 1 or 2% solution of the gas. Also for gastric fermentation accompanied by sarcinæ, and in typhoid (20 to 30 minim doses, diluted) every 2 or 3 hours.

Magnesii Sulphis. $MgSO_3+6H_2O=212{\cdot}476$.

Dose.—10 to 30 grains (**0·6 to 2 Gm.**).

White crystalline powder. Soluble 1 in 90 in water. Given in diphtheria and other infectious diseases. Large doses may be given with impunity. **Tablets** 5 grains.

Sodii Hyposulphis.—*Syn.* SODIUM THIOSULPHATE (*Off.*), **U.S.** $Na_2S_2O_3+5H_2O=248{\cdot}20$. *Dose.*—10 to 60 grains (**0·6 to 4 Gm.**)

Crystals soluble in water 1 in 1. Insoluble in alcohol.

Uses.—As a lotion, 1 in 10 for chloasma, ringworm, &c. It may be made to evolve sulphurous acid as, *e.g.*, in the following : Sodium Hyposulphite 6, Diluted Sulphuric Acid 1, Water 32.

Useful in clearing out the intestinal tract (in arterio-sclerosis).

In Italy medical men and the general public demand sodium hyposulphite (specially re-crystallised). For internal use the dose is from 1 to 6 grammes as a purgative ; its antiputrescent action is said to be superior to that of the sulphite. While passing through the blood stream it is transformed firstly into sulphite and then into sulphate.—Ph. Notes.

Intravenous Use.—Arsenical dermatitis and mercurial poisoning well treated by Sodium Thiosulphate intravenously—stated to be non-toxic up to 2 Gm. doses.—W. L. McBride and C. C. Dennie, per Jl. Trop. Med., April 2/23,114.

In dose of 3 to 4 injections of 0·45 to 0·6 Gm. in 5 Cc. of water intravenously alternate days it is potent for Mercurial and Bismuth Stomatitis and for effects of Arsenical toxæmia—possiblyfor all acute metal poisoning.—H. C. Semon, B.M.J. i./24,664.

DISTEMPER in dogs is well treated by Sodium Hyposulphite. First give a purgative of 4½ to 7½ grains of each Calomel and Scammony, then the hyposulphite, 9 to 15 grains in milk or sugar and water next day for 10 days.

Respirator Solution.—Sodium Carbonate Cryst. 60, Sodium Hyposulphite 52, Water 100. A proportion of Glycerin should be added to keep the wool or material moist. P. A. W. Self came to the conclusion that the above is the most satisfactory to neutralise both Chlorine and the Acids formed.—P.J. ii./15, 133.

Sodii Hydrosulphis. $Na_2S_2O_4=174{\cdot}12$.

White powder soluble in water. An active reducing agent used in manufacturing processes.

Sodii hydrosulphidum. *Syn.* Sodium Sulph-hydrate. $NaHS=56{\cdot}18$.

When fresh this is in hygroscopic crystals, very soluble in water. Used in analytical work.

ACIDUM TANNICUM.

Syn. TANNIN. $C_{14}H_{10}O_9=322{\cdot}15$.

Dose.—5 to 10 grains (**0·3 to 0·6 Gm.**).

Extracted from galls with ether containing a little alcohol and water.

Estimation by precipitation with an aqueous solution of Strychnine Acetate. It was found that after drying all Tannins gave the same result. using the factor 0·6558 for converting the Strychnine Tannate into Tannin.—S. R. Trotman, C.D. ii./13,851.

Soluble in water 1 in 1 slowly, and in glycerin, less so in alcohol 90%. Almost insoluble in ether and chloroform.

Incompatible with ferric salts, acids, alkalis, silver and other metals and with gelatin, *cf.* Tannalbin *infra.* Furthermore, Tannin

solution precipitates the majority of alkaloids from solution, hence is occasionally employed as an antidote to these.

Uses.—Throat and mouth wash 1 to 2%. Astringent and styptic in powder form for epistaxis (by coagulating the albumin). Sometimes given in dysentery. Rectal injection of 30 grains in a quart of hot water, with or without opium, has been given in cholera. Burns have been treated with a 2 to 3% solution in ether painted over the part 2 or 3 times daily. It is a useful astringent applied to the gums and as an ingredient in tooth powders.

Glycerinum Acidi Tannici, atque cum Alumine, *v.* Glycerin.

Gargarisma Acidi Tannici contains 10% of Glycerin of Tannin.

Lotio Acidi Tannici Sulphurosa ST. BART.'S H.

Glycerin of Tannic Acid 1, Sulphurous Acid 1, Water to 8.

Ovules with Theobroma basis for vaginal discharges.—*v.* Ovules.

Pessus Acidi Tannici 10 grains each in theobroma oil basis, 120 grains weight.

Suppositoria Acidi Tannici (*Off.*).

3 grains with theobroma oil *q.s.* to 15 grains.

℞ ℙ1 **Suppositories of Tannic Acid with Opium,** 1 grain in addition, or ℞ ℙ1 Morphine ½ gr.—The latter are W.H.

Aluminii Tannas.—TANNAL INSOLUBILE.

$Al_2(OH)_4(C_{14}H_9O_9)_2 + 10H_2O$ is made by precipitating a solution of Aluminium Trisulphate with Sodium Tannate (not Tannin as stated in the paper) or better by treating freshly made Aluminium Hydroxide with Tannin Solution.—W. H. M. As astringent for chronic catarrh of the respiratory organs. —Y.B.P. 1913,122.

Albuminum Tannicum. P. Jap. *Syn.* ✱**Tannalbin.** (TRADE MARK 216134/1899, renewed 1912; PATENTS: see below, both became void). *Dose.*—8 to 15 grains (**0·5 to 1 Gm.**), P. AUSTR., PH. NED.

A compound of tannin with albumen, in pale brown insoluble, tasteless powder.

Manufacture.—According to the Patent Specification 6140 of 1896 Albumin 1 and Tannic Acid 2 are dissolved separately and mixed with stirring and the precipitate washed by decantation, etc., and dried. *Subsequently* the compound is to be heated for 6 to 10 hours at a temperature of 110° or up to 150° C. (This heating we found is of importance to render the Albumin portion resistant to solubility *v. infra.*—W. H. M.)

In a subsequent patent, 13,281 of 1896, the precipitate is directed to be left in contact with three times its volume of 90% Alcohol or twice its volume of 25% Hydrochloric Acid before filtering, washing and drying. This is said to obviate the necessity of heating the preparation as described.

The object of the preparation is to produce an Albumin Tannate (containing 50% of each of its components) which shall be soluble with difficulty in the stomach and shall dissolve gradually in the (alkaline) intestines.

TAMBACH'S TEST is used to ensure a satisfactory preparation. To determine the resistance to the stomach juice maintain at body temperature for three hours without stirring a mixture of 2 Gm. of Albumin Tannate with 100 Cc. of water containing Pepsin 0·25 Gm. and 20 drops of strong Hydrochloric Acid. The amount undissolved after washing with a little cold water and collecting on a weighed filter paper and drying at 100° C. should not be less than 1 Gm.

We found the effect of heating a sample to 120° C. is to render it less soluble in the digestive fluid than if dried at 60—70° C. only, *e.g.* 2 Gm. dried at 60° C. gave 0·76 Gm. of undissolved residue by Tambach's Test, whereas 2 Gm. of the same sample heated to 120° C. for 2 hours gave 1·2 Gm. of undissolved residue. It is of interest to note that the sample dried first at 60° C. lost 10% of its weight on heating to 120° C. for two hours.

Uses.—A disinfectant soluble in the intestines, but unaffected by the stomach, given for diarrhœa.

Zinci Tannas. *Syn.* "SEL DE BARNIT."
Is obtained by treating Zinc Oxide 10 in Water 15 with Tannin 50 in Alcohol 45% 100. Dry at gentle heat. We have found this method satisfactory.
Used as ophthalmic application and for decubitus and other skin lesions.
Further **Tannates**. Details of making.—Y.B.P. 1913,125.

Di-acetyl-tannin. *Syn.* **Acetannin. ✱Tannigen.** (TRADE MARK 322568; PATENT 1228/1894 ***Expired***).
$C_{14}H_8(COCH_3)_2O_9 = 406{\cdot}232$.
Dose.—5 to 15 grains (**0·3 to 1 Gm.**) in cachet.
A tasteless, insoluble powder, but rendered soluble by alkali. In diarrhœa. Dissolves in the intestine appearing in the urine as gallic acid. Should not be prescribed with alkali. P. G. V. defines as mainly a mixture of Diacetyl and Triacetyl-Tannin.

Methyl Ditannin. *Syn.* ✱TANNOFORM (T.M. 216873). $C_{21}H_{20}O_{18}$= 656·305.
A compound of tannin with formaldehyde in reddish-white powder insoluble in water, soluble in alcohol and alkalis Used as an antiseptic in ointment (1 in 10) or dusting powder alone or with 1 to 4 parts of starch, for bedsores, hyperhidrosis, pruritus, eczema (particularly in interdigital eczema), and piles. In diarrhœa (*Dose*—from 1 to 20 grains according to age) and enteritis and for tender feet. Is official in P.G.V.

ACIDUM TARTARICUM (*Off.*).

$(CH.OH.COOH)_2$=150·068.
Dose.—5 to 20 grains (**0·3 to 1·2 Gm.**).

Manufactured from acid potassium tartrate by heating with water and sufficient calcium carbonate to almost neutralise, converting thus into insoluble calcium tartrate and soluble neutral potassium tartrate. The latter is also converted by aid of calcium chloride into calcium tartrate. The two portions of calcium tartrate are washed and then decomposed with the necessary quantity of sulphuric acid.

Soluble 10 in 8 water, 1 in 2½ alcohol 90%, 1 in 4½ glycerin, 1 in 120 ether 0·720, 1 in 5 absolute alcohol. Nearly insoluble in benzol and chloroform.

Incompatible with alkaline carbonates, and with potassium, calcium, and mercury salts.

Uses. For making Granular Effervescent Preparations, Effervescing Tablets (see Neutralisation Table for equivalents), and cooling drinks.

Specificity in Antiseptics.—This acid (as also Malic Acid) has been found to be active against *B. aerogenes capsulatus. Vide Vol. II.*

For details as to presence of Lead in Tartaric Acid and Method of Estimation also for Acidum Glutaricum, Syn. Pyrotartaric Acid, see *Vol II.*

Collutorium Acidum *Syn.* **Acid Mouth Wash B.D.H.**
Tartaric Acid 1 grain, Potassium Acid Tartrate 2 grains, Lemon Oil 3 minims, Saccharin Soluble ¼ grain, Water to 1 ounce.

P1 ACONITI RADIX (*Off.*).

P1 *Aconite, Aconitine, and their preparations.*
Root collected from *Aconitum Napellus* (*Ranunculaceæ*) and dried. B.P. gives no dose but requires not less than 0·4% ether-soluble alkaloids. FR. Cx. gives *Dose* (max. single), **0·1 Gm.**; max. during 24 hours **0·3 Gm.** That of P. BELG. in powder dried at 100° C. contains 0·8% alkaloids. If more, dilute with milk sugar.

P.G. and Fr. Cx.—Selected heavy roots from the wild plant collected before end of the flowering season. U.S. contains 0·5% ether-soluble alkaloids, with average dose ½ grain (**0·03 Gm.**)

Use.—Anodyne, diaphoretic, diuretic.

Externally the liniment, as such, or mixed with chloroform or belladonna liniment in neuralgia and rheumatism (causes tingling and numbness).

Internally the tincture diminishes the force and rate of the pulse, especially in the early stages of fevers and mild local inflammations such as feverish cold, laryngitis, and first stages of pneumonia, erysipelas and gonorrhœa. It also relieves the pain of neuralgia, pleurisy and aneurism. Large doses cause tingling of mouth and skin generally.

Acute tonsillitis. Children generally well treated by Aconite. For a child 5 to 10 years old, 1 to 2 minims of Tincture.—Yeo.

Physiological experiments on small animals show that Aconite is of no avail in reducing the frequency of the pulse, but in clinical practice we are familiar with good results obtained in some manner from its use.—Sir Dyce Duckworth.—B.M.J. i./11,1217.

℞ **Aconiti Folia** may contain as much as 0·6% total alkaloid.

Fr. Cx. employs fresh leaves for making Alcoolature d'Aconit, 1=1 using 95% alcohol for macerating 8 days. Max. single dose 1 Gm., max. daily dose 5 Gm.

Antidotes.—Apomorphine $\frac{1}{10}$ grain hypodermically or an emetic of mustard or Ipecacuanha Wine; stimulants; Amyl Nitrite. Atropine Sulphate $\frac{1}{50}$ grain hypodermically has been recommended, also Digitalis tincture 20 minims hypodermically in course of 4 hours was successful.

Aconite poisoning from taking Liniment in error. As Ipecacuanha Wine, —a cardiac depressant—had been given as first antidotal treatment, it was thought well to give only one mustard emetic to save the enfeebled heart. Head was kept low—feet raised, a sinapism was placed on the heart and hot flannels to the extremities and abdomen. Strychnine and digitalis hypodermically and brandy per rectum. Artificial respiration kept up unceasingly, recovery after six hours. Quantity of Aconite was sufficient to kill six persons.—L. i./11,162.

Poisoning by a tablespoonful of Liniment containing 40 minims each Lin. Aconiti, Lin. Belladonnæ, Lin. Chloroformi and Tinct. Capsici with 80 minims Gaultheria Oil. There was no dilatation of the pupils as would have been expected, nor odour of Wintergreen, but vomiting occurred smelling strongly of it. Recovery under Liquor Strychninæ, 10 minims hypodermically and 8 ounces of hot strong coffee into the rectum. A remarkable recovery taking the aconite into account, which amounted to 35 times the maximum dose of the official tincture.—L. ii./10,1270.

For Aconite and Belladonna combined see also 'Poisons and Antidotes.'

℞ **Chloroformum Aconiti, B.P.C.** 1=1. Prepared as Chloroformum Belladonnæ.—B.P.C. 1907.

℞ **Extractum Aconiti Radicis Alcoholicum.** Fr. Cx (Extrait d'Aconit) prepared from the root with 70% alcohol and standardised to 1% alkaloids. *Max. single dose*, ½ grain. Max. during 24 hours 1½ grains approx.

℞ **Fluidextractum Aconiti, U.S. IX.**

Average dose.—**0·03 Cc.** (½ minim). Standardised to 0·5 Gm. ether soluble alkaloids of Aconite in 100 Cc.

℞ **Linimentum Aconiti** (*Off.*).

Prepared by macerating and percolating the root with Alcohol 90%. Useful in neuralgia. *It is not suitable for painting on the gums.*

Should contain 0·2% *w/v* ether-soluble alkaloid.

9 minims of Aconitine liniment=about $\frac{1}{30}$ grain aconitine has proved fatal.

℞ **Linimentum Aconiti Compositum.** G.H.

A.B.C. Liniment.

Aconite Liniment, Belladonna Liniment, Chloroform Liniment, equal parts. To be well shaken before use, as the olive oil in the chloroform liniment is not soluble in the other ingredients. B.P.C. uses Liniment of Aconite 2, of Belladonna 2, Chloroform 1. Miscible. ℞ **Linimentum Aconiti cum Chloroformo**, B.P.C. Chloroform 1, Aconite Liniment 7.

The Oil in the original 'A.B.C.' formula seems to be essential—otherwise proves too irritant to sensitive skins.

Poisoning by ½ ounce of A.B.C. liniment. Liquor Strychninæ and saline enema 2 pints, containing 2 ounces brandy, saved life. Afterwards ¼ grain morphine. The lethal effect of the aconite was abolished by stimulating action of the atropine.

See also Poisons and Antidotes

A.B.C. Lotion, St. Th. H. contains Carbolic Acid and Borax. Possible confusion with Aconite, Belladonna and Chloroform Liniment.—L.ii/22,1021.

℞ **Pilula Aconiti.**=2 minims of tincture, *i.e.* $\frac{1}{5}$ grain approx. of Root in each. *Dose.*—1 hourly.

℞ **Tinctura Aconiti** (*Off.*).

Caution.—About twice as strong as B.P. '98.

Strength 1 in 10 approx. by percolating dried root in No. 40 powder with 70% alcohol and standardising to 0·04% ether soluble alkaloid.

Dose.—2 to 5 minims (**0·12 to 0·3 Cc.**). As a febrifuge 2 minims every 10 minutes or quarter of an hour for an hour, then repeat dose every hour till skin acts well and temperature is reduced.

Fr. Cx. has this strength made with 70% alcohol. It is termed *Teinture d'Aconit au dixième* and has max. single *dose* 9 minims approx.

P.G. (1 in 10). Maximum single dose, 0·5 Gm. Max. daily dose, 1·5 Gm. U.S. has 1 in 10, assayed to not less than 0·045 or more than 0·055% ether soluble alkaloids. Average dose 5 minims. **P. Belg.** contains 0·05% alkaloids.

℞ **Tablets** are prepared each equivalent to 2½ minims. To be directed to be dissolved in a little water.

℞ **Pastilli Aconiti, and** ℞ **Trochisci** contain each 1 and ½ minim of Tincture respectively. Given in fevers and mild inflammatory conditions.

℞ **Fleming's** and **Turnbull's Tinctures** of **Aconite** are about six times the (*Off.*) strength. They are used externally, and were given internally in doses of 1 to 5 minims.

Pharm. Form. says it should be particularly noted that Tincture

of Aconite *Fleming* of all prescriptions, except British and American, is not this preparation but a 1 in 10 tincture.

Tincture of Aconite (*Fleming*) combined with equal volume of Weak Tincture of Iodine (*Off.*) is frequently ordered to be painted on the gums for pain.

ℙ1 ACONITINA (*Off.*).

Syn. ACETYLBENZOYLACONINE. $C_{34}H_{45}NO_{11}=643{\cdot}538$.

ℙ1 Crystallised Aconitine.

Dose.—$\frac{1}{600}$ grain to $\frac{1}{200}$ grain (**0·0001 to 0·0003 Gm.**), and may be increased if desired with extreme caution, the maximum single dose being 0·001 Gm.

FR. CX. gives 0·0005 Gm. as maximum during 24 hours.

B.P. gives no dose, U.S. *average dose* $\frac{1}{400}$ grain.

An alkaloid obtained from *Aconitum napellus* root and dried leaves —content about 0·03%. In colourless crystals. ***Soluble*** in dilute acids, alcohol and chloroform (1 in less than 1), less readily soluble in ether, and almost insoluble in water and petroleum ether ; melts at 198° C. In weak acetic solution yields a red crystalline precipitate with potassium permanganate.

U.S. tests for pseudaconitine and atropine by Vitali's test.—*q.v.*

A drop of dilute solution placed on the tongue produces a characteristic tingling sensation.

Antidotes** vide **Aconite.

Uses.—Employed externally (*vide* Unguentum Aconitinæ and Oleatum Aconitinæ) in neuralgia, *avoiding mucous membranes, and raw skin.* Internally in the form of a pill is a depressant, calmative, and diaphoretic.

ℙ1 Aconitinæ Nitras. $C_{34}H_{45}NO_{11}HNO_3=706{\cdot}554$. A crystalline stable salt, soluble in water and alcohol. *cf.* Vol. II.

Dose.—$\frac{1}{600}$ grain (**0·0001 Gm.**), hypodermically.

ℙ1 Hypodermic Tablets ($\frac{1}{640}$ grain), to be dissolved in warm water.

ℙ1 Granules of Aconitine FR. CX. and of **Aconitine Nitrate** FR. CX. contain $\frac{1}{10}$ mgr. in each, and are coloured pink.

ℙ1 Aconitinæ Hydrobromidum. $C_{34}H_{45}NO_{11}.HBr.2\frac{1}{2}H_2O=769{\cdot}506$, and **ℙ1 Aconitinæ Hydrochloridum** are crystalline Salts with dose as for the Nitrate.

ℙ1 Oleatum Aconitinæ.

Aconitine 2, Oleic Acid by weight 98. Dissolve ; may be perfumed —is painted on the skin (avoid broken) for neuralgia.

ℙ1 Unguentum Aconitinæ (*Off.*).

Aconitine 1, Oleic Acid (by weight) 8, (1 grain=2 drops) heat gently to dissolve, and add Lard 41. Mix thoroughly. Best freshly prepared. A piece of the size of a bean is gently rubbed in for facial neuralgia, avoiding broken skin and mucous membranes.

ADEPS LANÆ.

Wool Fat (*Off.*). **U.S., Ph. Ned.** ANHYDROUS LANOLIN.
The purified yellowish cholesterin fat of sheep's wool, M.pt. about 40° C. Sheep's wool yields from 10 to 30%.

TRADE MARKS: 'Lanoline' 50214 (Class 48) and 50215 (Class 3), 1886, renewed 1899 and 1913. PATENT 4992/1882 *expired*. The specification states that 'the invention relates to a new or improved manufacture of fatty matter from Wool Fat termed "Lanolin." The process described is of centrifugalising waste liquors of wool washing and purifying by a suitable solvent.—*cf.* C. D. March 20/15.

Manufacture.—Adeps Lanæ B.P. is now a British made article. This product had for many years been imported from Germany, and a good deal of experimental work was necessary at the outset in this country to perfect certain details, for example in the matter of colour, odour and proneness to acidity. The British made article is now 'better than B.P.' The *Lancet* of November 11th, 1916, for example, found only 0·42% acidity in a British product against a presumable limit of 0·7%. (Note a slip here in the B.P. directions. 2 Gm. should be taken for titration, not 0·2 Gm.).

Soluble 1 in 25 ether, 1 in 18 oil of turpentine (both with some residual matter), almost insoluble in alcohol 90%.

Adeps Lanæ can only be saponified by alcoholic solutions of Potash under pressure—paraffin can be easily detected by this means.

Adeps Lanæ Hydrosus. **Hydrous Wool Fat** (*Off.*). Commonly known as 'Lanolin.' Wool Fat 7, Distilled Water 3. Melt and mix. FR. CX. has 25% water.

Yellowish white ointment basis. More water, up to about equal weights of fat and water, may be incorporated with it without affecting its consistence. Soluble partly in alcohol, while ether and chloroform dissolve only the fats it contains.

Wool Fat is readily absorbed by the skin (especially if washed with ether). It helps absorption of narcotic extracts, quinine, iodine, potassium iodide and chaulmoogra oil.

When an ointment containing Mercuric Chloride or Carbolic Acid is ordered, it is usually intended for antiseptic purposes, therefore the *anhydrous* should be used, otherwise caustic action may result.

Sapolanoline. Lanolin 5, Soft Soap 4. For acne and eczema.

Unguentum Lanolini.
Lanolin (hydrated) 2, Soft Paraffin or Vaseline 1. Mix. May be perfumed to form **Lanolin Cream.** Less sticky than Lanolin.

Lanolin, lard and soft paraffin, *p.æq.* melted, give a useful basis, as also Wool Fat 9, with Almond Oil 1. **Unguentum Lanæ Compositum** (*Off.*), is Wool Fat 2, Prepared Lard 2, Paraffin Ointment 1.

Cremoas. A proprietary basis for making Vanishing Creams, Cold Creams and Toilet Creams generally. In the presence of a trace of alkali it will combine with from 1 to 5 times its weight of water, forming a white cream which is free from a greasy or sticky feeling. It may be mixed with Lanolin and water.

For other Ointment bases see Unguenta and for M.pts. of Fats, Table, *Vol. II.*

Cholesterin $C_{27}H_{45}OH + H_2O = 404{\cdot}519$, is prepared from wool fat by saponifying the same with potash, and extracting the chloresterin with ether. It is also a constituent of gallstones, often to the extent of 90% or more, and can be obtained from these by extraction with spirit.

Tuberculosis is well influenced by giving cholesterin, to which it is thought to have antidotal power, as well as to strychnine and curare. Lecithin and cholesterin are antagonistic. Lecithin was found to increase the poisoning power of curare and cholesterin to reduce it. Cholesterin is capable of arresting ferment production by lecithin. In carcinomatous tissue active intracellular ferments are thought to be present which are first set in action by lecithin. This substance is always found in marked amount in rapidly growing tissues. The administration of cholesterin will eliminate lecithin. Fifteen cases so treated showed diminution—and indeed disappearance—of the tumours.—M.'08,184.

For pernicious anæmia, cholesterin in form of cream and butter *ad lib.* has been given with success. (Cholesterin is antagonistic to hæmolysis.)

Blackwater fever has been treated by Cholesterin internally with success. Treatment based on action of Cholesterin in different kinds of hæmolysis. Amelioration rapid—the urine beginning to clear in 2 to 6 hours after first dose. Also given as preventive. Generally gave 2 to 4 doses of 1 Gm. with intervals of 4 to 6 hours, suspended in milk.—Transvaal Med. Jl., July '10, per Pres. Oct. '10, p. 183.

ÆTHER (*Off.*).

℗ *Applicable to Ireland.*

$C_2H_5.O.C_2H_5 = 74{\cdot}10$.

Syn. ÆTHER SULPHURICUS; ETHYL OXIDE.

Dose.—45 to 60 minims (**3 to 4 Cc.**), or 15 to 30 minims (**1 to 2 Cc.**) repeated.

Manufactured by the distillation of Sulphuric Acid and Alcohol—Ethyl Hydrogen Sulphate being first formed which reacts with a further quantity of Alcohol liberating Æther and Sulphuric Acid again; in this manner the Acid will react with a very considerable quantity of Alcohol. Sp. Gr. 0·720.

Soluble 1 in 10 of water, and the ether similarly dissolves about the same amount of water. Is miscible in all proportions with alcohol. Ether is a solvent for a number of alkaloids, fats, resins, and of mercury perchloride and biniodide, also of bromine and iodine.

Commercial Varieties in General Use.

(1) *From Pure Alcohol.*

Æther Purificatus (*Off.*). For inhalation as anæsthetic. **'Æther.'** PH. NED., P. Helv. and P. Jap. Sp. Gr. 0·720, *Syn.* **Æther Purissimus, Ether officinale, Æther pro Narcosi.**

In our own and several Continental Pharmacopœias this is directed to be carefully tested and preserved.

(2) *From Methylated Alcohol.*

Ether, 'Methylated,' Sp. Gr. 0·717 to 0·719.

Contains a little methylic ether, and is specially adapted for spraying to produce local anæsthesia, as it begins to boil below 27° C. (80° F.), and is free from water. It is not adapted for producing general anæsthesia.

Rectified Ether, Sp. Gr. 0·720. For General Anæsthesia.

Ether, well washed to purify it and redistilled. For producing general anæsthesia, if standing the tests given for purified ether.

Sterules, Anæsthetic, contain 1 and 2 ounces (30 and 60 Cc.) of this Ether for the operating bag and (being sealed) for hot climates.

Methylated Ether, Sp. Gr. 0·730 and 0·735.

Is adapted for pharmaceutical extraction purposes, ice machines, &c. For photography a purer preparation, Sp. Gr. 0·725, is made.

***Ethanesal** (T.M. 410750). Was described as Ether free from mercaptans and aldehydes. It contains, dissolved, certain ketones, some CO_2 and some Ethylene, perfectly pure Ether being the vehicle. It keeps better than ordinary Ether. The CO_2 appears to act as a stabiliser. It is less irritating than ordinary Ether and stimulates the respiratory system less—used in 250 cases.—R. L. Mackenzie Wallis and C. Langton Hewer, B.M.J. i./21, 565; L. i./21,1173; Pr. Mar./22,168. *See also* Sir C. English.—L. ii./23,302.

Anæsthesia with it thought to be too light for abdominal and rectal work. —C. Charnock Smith, B.M.J. i./21,622. Several good reports on.—H. Pinto-Leite, *ibid.* 658.

It was subsequently described as a 5% solution of mixed ketones saturated with Ethylene and CO_2, dissolved in detoxicated Ether. It contains no Alcohol.—L. ii./22,341.

Favourable results with. Query as to chemical composition.—K. B. Pinson, L. i./21,1382.

Administration of Ethanesal in cerebellar operations—some points in technique.—C. T. W. Hirsch, M.P.C. May 9/23,377.

The preparation was found to consist of 95·5% Ether with about 4% of normal Butyl Alcohol and a small quantity of an aldehyde. Anæsthetic properties to be attributed to Ether.—H. H. Dale and co-workers.—L. i./23, 424.

Uses.—Internally Ether is a rapid stimulant in syncope. Is carminative. May relieve dyspepsia and asthma. Hypodermically it saves many lives threatened by syncope, collapse, and shock from hæmorrhage and injury, but a pharmacologist says it is not a direct cardiac stimulant. It depresses nerve tissue, in very large doses it tends to depress muscle tissue, including cardiac muscle, but it never excites.—B.M.J. ii./09,329,540.

Whooping cough well treated by ether injected intramuscularly in the upper part of the buttock. Supposed to act by combating the spasmodic element of the disease. 1 Cc. up to age of 7 or 8 months, and in older children 2 Cc. repeated daily or on alternate days—not invariably successful.—L. i./21,1311. Most dramatically successful: also useful in broncho-pneumonia.—B.M.J.E. ii./22,49.

For general anæsthesia ether produces less depression on the heart than chloroform, but its use is unpleasant both to the patient and to the operators. Its suffocating action on the patient, if suffering

from any lung or bronchial affection, is very irritating, and has proved fatal. Care must be taken not to employ it near a light: its vapour is 2½ times heavier than air and very inflammable, and as an anæsthetic it has to be used freely.

Dangers from Ether are usually respiratory and due to excess of saliva; Atropine hypod. before the ether prevents this. Inversion, pulling the tongue and slapping the back usually expels mucus.—R.D.H.

Crile's Nasal Tube method of giving Ether. Less Ether is required than by employing the ordinary way using the open drop method. An injection of Morphine ¼ grain with Atropine $\frac{1}{75}$ grain is given an hour before the operation. Oxygen in addition not found necessary.—L. ii./09,364.

With flannel or with lint in the open method (Skinner's mask) so adjusted that all inspirations and expirations pass through the fabric, a more or less equable atmosphere containing approximately 8 or 9% of ether vapour may be depended upon.—L. i./12,217

As an anæsthetic, **rectal use** of Ether is favoured by some, *e.g.*, where presence of the Ether cone over the face would hinder the operation; or, secondly, in diseased condition of the lungs. Contraindicated in diseased state of the intestines and generally in abdominal cases. Several advantages are claimed. It is thought that a definite percentage of Ether in the entire circulation is required to produce complete surgical anæsthesia. In human beings this amounts to a little under six volumes per cent. A mouth tube is sometimes added.

Anæsthesia in throat and nose operations. Ether is thought to be the proper anæsthetic—safer than chloroform.—Felix Rood, L. i./20,433.

Deaths during ether anæsthesia. See last edn., p. 107. Also Atropine and open Ether, *postea*.

Sterules of Ether contain half a drachm in each for hypodermic injection as a dose in heart failure. 20 to 60 minims have proved a successful restorative in typhoid fever and for dyspnœa, but *cf. antea*. These are made with 0·735 ether.

Sciatica has been treated by injection of ether with either cocaine or morphine subcutaneously into the sciatic nerve. 5 minim doses of ether with 2 minims of 1 in 12 cocaine or morphine injection 3 minims, with 2½ inch needle.

Oxygen and Alcohol administered during anæsthesia by Ether or other Anæsthetics. Apparatus is described by means of which Oxygen is bubbled through Absolute Alcohol, and thence the combined vapour mixes with the anæsthetic in a mask.—L. i./11,331. *cf.* **Oxygen and Alcohol Administration.** The apparatus consists of a cylinder of Oxygen, wash-bottle containing Alcohol with exit tube above leading to a Schimmelbusch mask or Hewitt's modification, which is specially adapted for giving Oxygen with anæsthetics. These are joined together in series in this order.

Oxygenated and warmed Ether as a general anæsthetic.—B.M.J i./10,320.

Prolonged Anæsthesia under Ether alternately with Gas and Oxygen.

With regard to Ether, the experience was that this anæsthetic used indiscriminately may lead to serious reduction of vitality.

Temperature sometimes remains subnorma for many hours. Nitrous Oxide in connection with Oxygen might be more generally used, but it causes inconvenient rigidity, also faintness, dilated heart, persistent vomiting, etc., but by using Ether alternately with 'Gas' and Oxygen these objections in great measure disappear Rigidity can be entirely avoided. The method consistsi n anæsthetising the patient with Ether, and when a certain degree of Ether saturation is reached cnanging to Nitrous Oxide and Oxygen—the latter being again dropped in favour of Ether on certain indications, and so on. The details are—when Ether anæsthesia is thoroughly established Nitrous Oxide and Oxygen in proportion of 96 or 95 to 4 or 5 is given. The corneal reflex, if still present, but dulled before the change, will now be abolished after a few breaths of gas, but the pupil will remain small and colour good. After two minutes or so the Oxygen must be increased to 12, 15 or 20%. Frequent breaths of fresh air are admitted, and generally at the end of five minutes it is advisable to return to Ether. This second Ether will probably extend over five minutes, after which Gas can be given for 10 minutes.

As the operation proceeds the Ether applications become shorter and the intervals between them longer. The anæsthesia is even, and shock during and after operation seems to be very slight. The method is applicable to a large variety of patients and cases. There is a wide margin between light and deep narcosis. Post operative conditions good. Nausea less than after open Ether. Rebreathing was allowed on a few occasions without apparent detriment.

In the discussion it was thought that the amount of Nitrous Oxide necessary must be very great, and hence the method seemed as if it would be cumbersome. The question of post-operative vomiting is fully gone into.—Fleming P.R.S.M. Sec. Anæsthetics, Dec. 1910, p. 1, *et seq.*

Gas and Oxygen (1 of Oxygen to 4 of Gas) in nose and throat work preceded by at most Atropine 1/200 gr. in children, or Morphine $\frac{1}{6}$ gr. c. Atropine 1/150 gr. in adolescents, or Combined Hyoscine, Morphine and Atropine for adults. Only a small amount of anæsthetic or a mixture of Chloroform and Ether (Ethanesal) is needed. —H. E. G. Boyle, B.M.J. ii./21,591.

Oil of Orange. *Effect of, on Anæsthesia.*

It is stated that an ounce of Essential Oil of Bitter Orange Pee and 3 ounces of Ether placed in the hot water bottle of Gwathmey's three bottle vapour anæsthesia apparatus, and Ether in the other two bottles, cause not only the odour of the anæsthetic to be completely disguised, so that the patient is unable to tell when its administration begins, but anæsthesia is improved. The result may be due to the pleasant sedative effect.—New York Medical Jl., per Pres.

A further article on the matter by Gwathmey is to the effect that Essence of Orange employed by him is composed of Oil of Bitter Orange Peel 1, Absolute Alcohol 3.—B.M.J. i./17,126.

Atropine and 'open Ether' administration.

An Atropine injection is given 1 hour before the ether to prevent the secretion of mucus in the air passages which may otherwise be caused by ether.—H. Bellamy Gardner, B M.J i./12,422

Enucleation of tonsils by dissection is best done under open ether preceded by 1/100 grain atropine. Suitable for all patients from six months upwards.—H. Tilley, B.M.J. i./19,781; ii./19,27. (A death under C_2E_8 and C_3E_1—H. S. Gabbett, *ibid* i/19, 739.)

Anæsthesia. A modification of the open ether method.—F. W. Silk B.M.J. i./19,635.

Crile's method of shockless surgery.—It consists of (1) a preliminary injection of Scopolamine to allay the patient's fear of the impending ordeal; (2) general anæsthesia with Ether, followed by (3) local anæsthesia with Novocain 1 in 200 combined with Adrenalin at the site of incision, and Quinine-urea-hydrochloride 0·75% solution into the peritoneum in cases of gastro-enterostomy. The object being to keep the brain free from shock before, during and after the operation.—W. I. De C. Wheeler, M.P.C. i./14,332

Ether Infusion Anæsthesia by means of Saline Solution.

Burghardt, the originator of the method of Infusion Anæsthesia, used an ordinary infusion apparatus containing a 5% solution of ether in normal saline. The present method is a modification of the above. An hour before the induction a hypodermic injection is given which consists of (in the case of a fairly robust adult) Scopolamine $\frac{1}{100}$ grain, Morphine $\frac{1}{6}$ grain, and Atropine $\frac{1}{100}$ grain (other cases according to age and condition of patient, etc.). The patient being on the operating table, the selected arm is bandaged to a splint, vein exposed (a few drops of eucaine may be used)—cannula tied in and the solution run in rapidly. Induction usually lasts about ten minutes. The apparatus used consists of a reservoir containing a 5% solution of ether in normal saline fixed about 8 feet above the floor level, the solution by means of a pipette drips into an indicator (capacity 8 ounces) fixed below this and from thence into a warming chamber to which the cannula is attached. The apparatus is controlled by a single tap placed just below the indicator. This tap, controlling the drips of the solution, affords an excellent index of the rate at which the solution is entering the vein.

The advantages claimed for this method of anæsthesia are the following:—

Surgical anæsthesia may be attained with 8 ounces of the solution, while for maintenance of the anæsthesia one pint an hour (1 ounce of ether) is in most cases enough. Great flexibility, patient can be adjusted with great nicety. Patient comes round within a few minutes. Post-anæsthetic vomiting and pulmonary irritation are both rare.—F. Rood, B.M.J. ii./11,974.

Solubility of Ether in Normal Saline.—At 15° C. 11·87 Cc. of 720 Anæsthetic Ether dissolve in 100 Cc. of Normal Saline (of strength 0·91% NaCl by weight).—R. R. Bennett, P.J. ii./12,146.

Ether Saline infusion compares favourably with other methods—5, 6 or 7% can be safely used. A 10% solution may produce hæmoglobinuria It is best to begin with 5%. The method is suitable even for the old and feeble. Recovery is rapid and post-anæsthetic vomiting rare.—F. Rood, B.M.J. ii./12,608; L. ii./12,1801. D. W. Buxton's "Anæsthetics," 6th Edn.

Strength 7½% and amount raised from 200 to 600 Cc. given in 3 to 7 minutes. In one case over 2 litres of the Solution were given.—G. A. H. Barton, B.M.J. ii./12,610.

An apparatus described for giving.—E. G. Schlesinger, L. ii./12,1220.

Satisfactory results in 170 cases from intravenous use.—Pres., Jan. '23,5.

Scopolamine-Morphine Atropine with Ether Saline.—

Scopolamine (1/100 grain) with Morphine (1/6 to 1/4 grain) and Atropine (1/100 grain), given about ¾ hour before operation—under 5% Ether Saline. The combination is very useful as the amount of Ether is reduced to a minimum. It is especially suitable for head, throat, etc., operations, as the anæsthetist is not in the way. The patient is spared the disagreeable sensations of inhalation method. No irritation of the respiratory organs; no after effects.—F. L. Napier, Glas. Med. Jl., July, 1912.

Intramuscular Etherisation.—

Ether injection into the buttocks, 0·45, 0·8 and 0·8 Cc. respectively administered to three patients. In the first Ethyl Chloride was necessary, and in the second and third Chloroform to hasten anæthesia. Another operator found that he failed to induce anæsthesia, though 60 to 70 Cc. in 10 Cc. doses were injected. The patient was drunk in consequence 24 hours, and became very excited.—L. ii./12 1802.

Intramuscular injections of Ether to produce general anæsthesia. Successive injections of 2 to 5 Cc. into gluteal region—into each side alternatively. Amount used roughly 1 Cc. per kilo body weight. Advantage in head and neck operations.—B.M.J. ii./13,394.

Intramuscular slow injection of Ether as anæsthetic; 5 Cc. every few minutes.—20 to 30 Cc. usually sufficient. Used in oto-rhino-laryngology.—B.M.J.E. ii./21,79.

Intratracheal Insufflation of Ether.—

Almost incredible operations have been done with this method on dogs, *e.g.*, complete removal of one or more lobes of the lung, complete division and suture of the thoracic œsophagus and complete division and suture of the transverse arch of the aorta. Employed in 25 cases with success.—B.M.J. ii./12,112; ii./13,393, 1621.

The method will maintain anæsthesia after it has been established by the usual manner. A tube ⅔ of the diameter of the trachea is introduced into it nearly to its bifurcation. A fairly rigid silk woven catheter 30 Cm. long is used—the average size for an adult being No. 21 or 22 French. The warm anæsthetic—Ether, or a mixture of Oxygen and Ether—is introduced by means of a pump or mechanical blower,—Elsburg's Apparatus is probably best. By this means respiration with full aeration persists, but with lessened respiratory movements.—D. W. Buxton's "Anæsthetics," 6th Edn.

Pharyngeal Insufflation Anæsthesia is a method of prolonging Ether anæsthesia after it is established by ordinary methods. The vapour is given through the nose by means of Crile's tubes, the mouth and nasopharyngeal space having been previously carefully cleansed.—D. W. Buxton's "Anæsthetics," 6th Edn.

For a further method of Intravenous Anæsthesia see Paraldehyde.

Oil Ether Anæsthesia. *Syn.* COLONIC ABSORPTION.—A mixture of Olive Oil and Ether in definite proportion and amount slowly introduced *per rectum*. An evolution of Intravenous Anæsthesia.

For children under 6 a 50% solution is used, allowing 1 ounce for every 20 lbs. of body weight. This is non-irritating and no preliminary medication is wanted. Between 6 and 12 years use 55 to 65% solution without preliminary medication. Keep the patient quiet and allow 20—30 minutes for the full effect. Use 1 oz. for every 20 lbs. body weight as before. Between 12 and 15 years use the same percentage and amounts, with possibly the addition of 1/12 grain Morphine and 1/200 grain Atropine hypodermically as a preliminary. From 15 years upwards a 75% mixture is used with same amount as before—1 oz. to every 20 lbs. It will be seen, therefore, that for an *adult* weighing about 160 lbs., 8 ozs. of the mixture would be wanted (*i.e.*, Ether 6 ozs. and Olive Oil 2 ozs.). The 8 ozs. should be passed in slowly, *i.e.*, it should take 5 minutes. A maximum strength of 65 % is now advised by Gwathmey.—D. W. Buxton's "Anæsthetics."

The method is claimed to be perfectly safe. The anæsthesia is automatically safeguarded by the gradual and equal absorption of the Ether from the colon and at the same time its rapid evaporation from the lungs. A further reason for the safety is the affinity of the Oil and Ether for each other.—J. J. Gwathmey, L. ii./13,1756.

The administration of Ether vapour *per rectum* has been employed and found to answer admirably for operations about the mouth, nose and post-buccal cavities. D. W. Buxton's apparatus consists of an Ether receiver holding 2 or 3 ounces and surrounded by a vessel containing water kept at 120° F. The vapour is conveyed to the rectum by a tube which has a glass intercepting drip chamber to prevent the passage of any liquid Ether which would be liable to cause dangerous results.—D. W. Buxton's "Anæsthetics" 6th Edition. See also B.M.J.E. i./15,46.

Ether (4 ounces) and oil (2 Ounces) as anæsthetic per rectum in diverse operations with success.—H. M. Page, and G. B. Mower White.—L. ii./17,643.

Chloretone 0·3 to 1·5 Gm. is given per rectum and after ½ hour Morphine and Atropine hypodermically. Twenty minutes later, Oil-Ether in proportion of 3 of Ether to 1 of oil (but this may be varied) is run into the colon slowly by catheter and funnel, one minute being allowed for each 30 Cc. The amount used is approximately 3 Cc. per kilo body weight. Should

never exceed 250 Cc. For head and neck operations.—A. E. Boyd, Dublin J. Med. Sci., May '20, p. 121, per Pres., Feb. '21,37.

Anæsthesia by **Oral Administration**: Ether 50% in Liquid Paraffin 1 to 2 ounces effectual in 90 seconds—probably the safest general anæsthetic and not followed by nausea. A little anaesthetic by inhalation may be wanted n addition. The dose may be sandwiched between mouthfuls of Port Wine. Useful for dressing wounds —J T. Gwathmey and H. T. Karsner.—B.M.J i./18 254.

Application of Ether to wounds employed in such inflammatory affections as peritonitis, periostitis, etc. Ether compresses considerably relieve the congestion.—M.P.C. ii./11,377.

Wounds have been swabbed out thoroughly with Ether (without watery solution beforehand).—B.M.J. i./15,398, also irrigated with 2% of Ether in lukewarm water with benefit.—A. Distaso and T. R. Bowen, B.M.J. i./17,259.

Infected wounds treated with Ether as antiseptic dressing. There was no sign of infection throughout the process nor rise of temperature.—B.M.J.E. ii./15,41.

Also by the Carrel-Dakin method of irrigation but it is costly and causes intense cold.—B.M.J. ii./17,598.

Ether is used as a menstruum and vehicle for skin medication, on account of solvent action on sebaceous secretion. Ethereal Tinctures and Solutions of Belladonna, Capsicum, Iodine, and Menthol are prepared.

Preparations.

Perles of Ether, 3 minims in each. *Dose.*—1 to 4.

Spiritus Etheris (*Off.*). Ether 1, Alcohol (90%) 2.

Dose.—60 to 90 minims (**4 to 6 Cc.**), or 20 to 40 minims (**1·2 to 2·5 Cc.**), repeated.

The older formula is occasionally prescribed, viz. :—

Spiritus Ætheris Compositus (B.P. '98.).

Syn.—HOFFMANN'S ANODYNE, Liquor Hoffmanni, but the simple Spirit of Ether is now called Hoffmann's Anodyne abroad

Mistura Ætheris cum Ammonia (*Martindale*). *Dose.*—1 to 2 ounces. Spirit of Ether 3, Aromatic Spirit of Ammonia 3, Water to 48. St. Th. H. terms this 'Patent'; with 1 grain of Camphor to the ounce 'Camphorated Patent.' A rapid stimulant. Gt. Orm. H. has Spirit of Ether 3½ minims, Aromatic Spirit of Ammonia 3½ minims, Tincture of Orange 2 minims, Chloroform Water to 1 drachm. Suitable for a child one year old.

℗ **Lotio Ætheris Composita.**

Hoffmann's Anodyne 250, Ammonia Solution 4, Distilled Water 25, Pilocarpine Hydrochloride ½; Spirit of Lavender 25. For hair falling off, applied with friction, after washing with soap.—B.M.J.E. ii./09,24. *Caution*: *Inflammable.*

Spiritus Ætheris Nitrosi (*Off.*).

Dose.—15 to 60 minims (**1 to 4 Cc.**).

An alcoholic solution containing ethyl nitrite (1·52 to 2·66% by weight), aldehyde and other substances.

For the Decomposition and Volatilisation of this preparation on storage, see Vol. II.

Uses.—Antipyretic, diaphoretic, diuretic, and stimulant. Relieves the spasm and pain of asthma, dysmenorrhœa, angina pectoris; also the pain of the passage of renal calculi and gall stones.

U.S. requires 3·5 to 4·5% ethyl nitrite.

Incompatible with Potassium Iodide (*cf.* Vol. II.), also with Phenazone unless previously neutralised with Sodium Bicarbonate; also incompatible with Salicylates and Ferrous Sulphate.

Ethyl Nitrite is the active ingredient; the other ingredients (Aldehyde, Ethyl Nitrate, Alcohol) play a subordinate part and of little practical importance. As there is a rapid loss of Ethyl Nitrite on mixing with water, it is best prescribed as such to be diluted just before use.—C. R. Marshall and E. Gilchrist, B.M.J. ii./15,125.

It is stated that it does not affect the kidneys nor the sweat glands; it is neither diuretic nor diaphoretic.—P.J. ii./10,298

***Itrosyl** (T.M. 177631).—A preparation for making Spirit of Nitrous Ether. Dilute the contents of one ampoule with 19 ounces of 90% Alcohol.

Liquor Ethyl Nitritis. **Solution of Ethyl Nitrite.** (*Off.*).

Dose.—15 to 60 minims (**1 to 4 Cc.**). Should be directed to be added to a small quantity of water at the time of taking.

A mixture of Absolute Alcohol 95 and Glycerin 5, containing in 100 parts by volume, 3 parts, or not less than 2½ parts by weight of Ethyl Nitrite (obtained by the interaction of alcohol, sodium nitrite, and diluted sulphuric Acid, at a low temperature). Store in small bottles. Sp. Gr. 0·823 to 0·826. It keeps better than the Spirit.

The circulation is distinctly affected by a fraction of a minim, yet large quantities do not cause death.—Leech.

Æther Aceticus. **Acetic Ether.** (*Off.*).—Consists principally of ETHYL ACETATE. $CH_3.COO\ C_2H_5$=88·084. FR. Cx., etc.

Dose.—45 to 60 minims (**3 to 4 Cc.**) or 15 to 30 minims (**1 to 2 Cc.**) repeated. Sp. Gr. 0·900 to 0·907. Not less than 90% pure. Boils between 165° and 172° F. (73·9° and 77·8° C.). Was used in preparing Liquor Epispasticus, and is inhaled for laryngeal catarrh, ½ drachm to the pint of warm water.

Soluble in all strengths in Alcohol and Ether, and about 1 in 11 of water.

Dimethyl Ether. $CH_3.O.CH_3$=46·058. A gas at n.t.p. Boils at 24° C. and at 100°C. exerts a pressure of 97 lbs. to the square inch. It can be safely compressed into cylinders. The gas condenses into a thin mobile liquid, with slightly ethereal, pleasant odour. Used as an anæsthetic.—L. ii./23,1302.

ÆTHYL CHLORIDUM.

Ethyl Chloridum (*Off.*) C_2H_5Cl=64·51.

Syn. CHLORYL ANÆSTHETIC. *****KELENE (T.M. 414307).

Dose.—A good average for an adult by inhaler is 5 Cc.

Using a Rendle's mask—by the 'open' method which is thought preferable to one involving the breathing and rebreathing from a closed bag of vitiated air, 7 to 8 Cc. are advised as adult dose, 5 Cc. for children of 7 to 12 years. Cyanosis and subsequent discomfort is certainly less. The anæsthesia may be prolonged by removing the mask and spraying more on the sponge.—B.M.J. i./11,1051.

Manufactured by the action of hydrochloric acid on absolute ethyl alcohol. If made (*Off.*) from Industrial Methylated Spirit will contain a small amount of Methyl Chloride. Tested (*Off.*) to contain 99·5% Esters calculated as C_2H_5Cl.

At ordinary temperatures this is gaseous, but condenses into a colourless mobile liquid with a sweetish burning taste. Slightly

soluble in water, readily in alcohol. Sp. Gr. 0·920 to 0·960 (U.S. about 0·921) at 0° C. (*Off.*) On account of its low boiling point about 50° F.) and the intense cold produced by evaporation, it is useful for producing local anæsthesia in minor surgical operations, also for allaying the pain of neuralgia. All fat must be removed from the part by washing with soap and then with alcohol or ether before applying. In dental cases the patient is instructed to breathe through the nose during operation, the part is well dried, and other parts protected. Its vapour is inflammable.

For inducing general anæsthesia, it is described as pleasant; is taken readily by children and adults, with few or no after effects. Probably within the limits for which it is intended it is safer than any other anæsthetic excepting nitrous oxide. It has the advantage of requiring no complicated apparatus. A closed mask must not be used. It is quicker in action than ether.

To prolong the anæsthesia induced by ethyl chloride chloroform has been advised as best. Ethyl Chloride (and Ethyl Bromide) are said to stimulate the heart, not to depress it as chloroform does.

Bulbs for general anæsthenia (large spray) contain 3, 5, 7, and 50 Cc. **Tubes** for local use 10, 15, 30 and 50 Cc. with screw or auto-stopper. **Bottles** for local or general anæsthesia 60 and 100 Cc. These 60 Cc. bottles are the most convenient for use. **Metal Cylinders** contain 55 Gm., 110 Gm., 1000 Gm.

Instructions for treatment if dangerous symptoms arise in administration—

Ethyl Chloride, or Somnoform. — See that the airway is clear and the clothing loose, and begin artificial respiration at once. Weak ammonia vapour may be held to the nostrils. Hot flannels should be placed over the heart, and chest smacked with a towel wetted in cold water. Artificial respiration must be kept up for at least an hour. The patient must be kept warm

For R.D.H. method proceed as under Chloroform.

For tonsils and adenoids Ethyl Chloride is as safe as Ether. No death from it recorded.—C. B. Dale, B.M.J. ii./19,616; G. A. H. Barton and others, *ibid*, 690; L.B.C. Trotter entirely disagrees, *ibid*; 'not very safe.'—D. W. Buxton, *ibid*. 725.

Ringworm well treated by Ethyl Chloride after washing with Sodium Bicarbonate, and Spirit of Ether.—L. i./14,242. Patients to attend six mornings a week for at least two weeks. Useful and reliable.—M. W. Geffen, B.M.J. i./22.267.

Skin frozen *around* area of operation—little pain.—Pres., Jan. '23,6.

✱**Dridustsol** (T.M. 384131) solutions in Ethyl Chloride of various *medicaments, e.g.* **Amyl Salicylate, Ethyl Salicylate, Methyl Salicylate** *aa.* 2%, ℞ **Cocaine** 1%, **Menthol** 5%, **Benzoic Acid** 2%, **Salicylic Acid** 2%, **Cresol** 2%, **Formaldehyde** 1%, **Guaiacol** 2%, **Iodine** 3%, **Iodoform** 2%, **Naphthol** 2%, **Phenol** 2%, **Resorcin** 2%, **Picric Acid** 2% **Mercuric Oleate** 1%, for spraying for antirheumatic, anæsthetic, and antineuralgic effect, for use in skin affections, and **Pyridine** 2% for inhalation. The spray is used at not less than 65° F. (18° C.) at a distance of 2 foot and deposits the medicament in a fine dry adherent powder or coating on the skin.

Warts have been treated with Ethyl Chloride—one application is sufficient if small, and for large warts at intervals of a week.

✱**Anestile** (T.M.248556) *for Local Anæsthesia.*

A mixture of ethyl chloride and methyl chloride evaporates lower than the ethyl chloride alone, is quicker and more extended in action.

Somnoform is said to be a mixture of Ethyl Chloride 60%, Methyl Chloride 35%, and Ethyl Bromide 5%. 60 Gm. glass tubes with "valve stopper" for inhalation as an anæsthetic in dentistry. **Glass Capsules** contain 3 and 5 Cc.

If **dangerous symptoms** arise in administering proceed as directed under ethyl chloride. In using, respiration must be watched carefully.

Hexachlorethane. $C_2Cl_6 = 238{\cdot}77$.

In colourless crystals very slightly soluble in water—about 1 in 2,000—more readily in Alcohol or Ether, or a mixture of the two.

This substance may possibly prove of value therapeutically. Physiological experiments gave the following:—The saturated solution had no effect on muscle, hence its toxic effect is considerably less than that of Chloroform (compared per molecule or per weight), with which, of course, it is chemically allied. Rats were fed with butter mixed with the crystals—no effect produced after 24 hours.

ÆTHYL IODIDUM.

Ethyl Iodide.—*Syn.* Hydriodic Ether. $C_2H_5I = 155{\cdot}97$.

May be obtained by distilling a mixture of alcohol, iodine, and phosphorus. A colourless liquid (but liable to become coloured by setting free iodine). Of a penetrating odour; boils at 148° F., has Sp. Gr. 1·94; is not inflammable. ***Soluble*** 1 in 400 of water, and miscible with alcohol and ether in all proportions.

Uses.—It is useful *inhaled* as an anæsthetic to relieve the dyspnœa of bronchitis. As it contains four-fifths of its weight of iodine, it forms a rapid means of saturating the system with this element; iodine can be detected in the urine 10 minutes after inhalation, and as long as 30 hours after; it neither impairs appetite nor weakens digestion.

In bronchial catarrh it induces sleep and promotes expectoration when inhaled. It is useful for inhalation in œdema of the glottis from catarrhal laryngitis. It acts as an antispasmodic in angina pectoris, spasmodic asthma and certain forms of nervous dyspnœa.

Internally Ethyl Iodide is found useful in bronchitis, asthma, rheumatism, and for secondary syphilis.

Externally 10 to 20% ointment with paraffin basis may be used (stronger may blister).

General iodization may be produced by painting the iodide on the calf of the leg or between the shoulders, and covering with impermeable dressing. The system may be saturated with Iodine in this way.—Whitla. In angina pectoris, inhalation of Ethyl Iodide useful, action thought to be due to liberation of free iodine which is rapidly absorbed by the blood.—Yeo.

Ethyl Iodide Sterules.

Encased in cotton wool and silk, containing 5 minims in each. The sterule is snapped, the fluid absorbed by the wool, etc., and inhaled for four or five minutes for spasmodic affections. This may be repeated three or four times a day. The patient requires no assistance, and can take one of the sterules from the bedside, in the dark if necessary.

In whooping-cough they have been found useful—the coughing fits are rapidly reduced.

℗**Ethyl Iodide and Chloroform Sterules** contain 5 minims of Ethyl Iodide and 10 minims of Chloroform, and are of the greatest service in the relief of asthma and whooping-cough.

℗**Ethyl Iodide, Chloroform and Menthol Sterules** as the last mentioned, with Menthol 1 grain in addition, are also made for use in bronchial affections.

Compound Ethyl Iodide Capsules L.H. contain these ingredients but $\frac{1}{8}$ grain only of Menthol.

Methyl Iodide. $CH_3I=141{\cdot}949$.

A colourless liquid (when first made) boiling at 44° C. Sp. Gr. 2·285. As a vesicant is even more powerful than Cantharides.

Blisters may be produced in a few hours by rubbing in 15 to 20 drops.

ALCOHOL ÆTHYLICUM.

($C_2H_5OH=46{\cdot}058$).

Together with notes on ALLYL, AMYL AND METHYL ALCOHOLS.

Alcohol Absolutum (*Off.*). **U.S., Ph. Ned.,** FR. CX.

Syn. ETHYLIC ALCOHOL, B.P. 1885.

Ethyl hydroxide, with not more than 1% by weight of water. Sp. Gr. 0·794 to 0·7969 representing 99·95% by volume and by weight to 99·4% by volume or 99% by weight.

FR. CX.—Sp. Gr. must not exceed 0·79683 at 15° C.

Alcohol (90% by vol.), (*Off.*). *Syn.* **Spiritus Rectificatus.** SPIRITUS VINI. **P. Austr.** 'SPIRITUS,' **Ph. Ned.**

Contains 90% by volume, or 85·68% by weight, of Ethyl Hydroxide Sp. Gr. 0·8337. Strength 57·80° O.P. (*i.e.*, 100 volumes contain the same quantity approximately of Ethyl Hydroxide as 157·8 volumes of proof spirit). It is generally manufactured commercially of higher alcoholic strength, *i.e.*, about 70° O.P., Sp. Gr. 0·809, containing nearly 95% by weight of Ethyl Hydroxide, and is diluted as required

'Alcohol,' U.S. has Sp. Gr. 0·816 at 15·56° C. (0·809 at 25° C.), and contains 94·9% by volume(92·3% by weight) of Ethyl Hydroxide. Alcool Ordinaire (officinal) FR. CX. has Sp. Gr. 0·81602 at 15° C., and contains approx. 95% by volume (92·43 by weight).

Diluted Alcohol (*Off.*). *Syn.* **Alcohol Dilutum**

Including Alcohol (90%)—see above—there are official five strengths, or "several degrees of dilution," of Ethylic Alcohol, four of which are directed to be prepared from the Alcohol (90%), and contain respectively 70, 60, 45, and 20% by volume of Ethyl Hydroxide.

For Alcohol Dilution Tables see Vol. II.

Alcohol Dilutum, U.S. 41·5% Absolute Alcohol by weight (48·9% by volume).

Note.—**U.S. IX.** orders frequently a mixture of 'Alcohol' (94·9% by vol.) 3 parts and water 1 part as menstruum in making Tinctures and Fluid-extracts. This is approximately equivalent to 70% by volume.

Spiritus Tenuior, Proof Spirit. B.P. 1885, contained 57% Ethyl Hydroxide by volume=49% by weight. Sp. Gr. 0·920. Prepared by mixing 5 volumes rectified spirit, Sp. Gr. 0·838, with 3 volumes of distilled water, the contraction being about 2·5%.

The greatest contraction occurs when quantities are in the proportion of 3 molecules of water and 1 of alcohol.—Tests, &c., P.J. i./07,404.

The addition of 100 to the number of degrees " overproof " gives the number of proof gallons, thus 100 gallons of 56 o.p. spirit = 156 proof gallons.

Immature Spirits (Restriction) Act, 1915.

1. (*a*) No British or foreign Spirits shall be delivered for home consumption unless they have been warehoused for at least 3 years :

Provided that—(*b*) This restriction shall not apply (i.) to spirits delivered to a licensed rectifier, to a manufacturing chemist, or to a manufacturer of perfumes or to other persons licensed by Customs & Excise (ii.) to spirits delivered for scientific purposes.

2. Nothing in this section of the Act shall interfere with the supply of Rectified Spirits of Wine for the purpose of making medicines to registered medical practitioners, to hospitals and to persons and firms and bodies Corporate entitled to carry on the business of Chemist and Druggist.

Duty and Rebate to Chemists.

The following table shows the alterations in Excise duty on spirit since 1908.

In April 1909 the duty was increased to				14/9	per	Pf.	gallon (from 11/-)
In May, 1915	,,	,,	,,	16/3	,,	,,	an increase of 1/6 over 14/9.
In April, 1918	,,	,,	,,	31/6	,,	,,	an increase of 16/9 over 14/9.
In May, 1919	,,	,,	,,	51/6	,,	,,	an increase of 36/9 over 14/9.
In April, 1920	,,	,,	,,	74/-	,,	,,	an increase of 59/3 over 14/9.

A ***Rebate*** of the various increases shown above as charged by the Excise authorities over the old 1909 duty of 14/9 is allowed to duly qualified Medical Practitioners, duly registered Pharmaceutical Chemists and Chemists and Druggists on all Duty paid spirit used by them in preparations recognised as *medicines* by the Customs and Excise authorities. The Rebate is not allowed on Tincture of Orange, Spirit of Peppermint, Mouth washes and the like. A complete record of spirit so used must be kept and claims for rebate must be made to the local Customs and Excise authorities for periods covering not more than 3 months since the spirit was used—a minimum period to claim for, is one month. The present increase of 59/3 per proof gallon over the old 1909 duty of 14/9 is equivalent to £4 13s. 7d. per bulk gallon of S.V.R. 90%, 58 °/p.

A *Stock Book* has to be kept for obtaining rebate (a well-arranged one is issued by Messrs. Fletcher, Fletcher & Co., Holloway), showing the date, bulk quantity, strength and proof quality of each consignment of spirit received and the details of use.

F. C. J. Bird issued a set of Tables (C.D. Dec. 27, 19) for making the claims for repayment in question. Quantities must be expressed in bulk gallons to the third place of decimals, and all strengths used are to be expressed in "proof." The following taken from the paper are useful :—

Proof Spirit Conversion Factors.

METRIC MEASURE.

Litres to Gallons—multiply by 0.2199.

To express :—

Litres of	90%	Alcohol B.P. in	PROOF	GALLONS..		Multiply by	0·3471
,,	70%	,,	,,	,,	..	,,	0·2697
,,	60%	,,	,,	,,	..	,,	0·2312
	45%	,,	,,	,,	..	,,	0·1733
	20%	,,	,,	,,	..		0·0767

IMPERIAL MEASURE.

Gallons	90%	Alcohol B.P. in	PROOF	GALLONS..		Multiply by	1·5779
,,	70%		,,	,,	..	,,	1·2263
,,	60%	,,	,,	,,	..	,,	1·051
,,	45%	,,	,,	,,	..	,,	0·7877
,,	20%	,,	,,	,,	..	,,	0·3487
Pints	90%	,,	,,	,,	..	,,	0·1972
,,	70%	,,		,,	..	,,	0·1533
,,	60%	,,		,,	..	,,	0·1314
,,	45%	,,		,,	..	,,	0·0984
,,	20%	,,	,,	,,	..	,,	0·0436
Ounces	90%		,,	,,	..	,,	0·00986
,,	70%	,,	,,	,,	..	,,	0·00766
,,	60%	,,	,,	,,	..	,,	0·00656
,,	45%			,,	..	,,	0·00492
,,	20%	,,	,,	,,	..	,,	0·00218
Drachms	90%	,,	,,	,,	..	,,	0·001233
,,	70%	,,	,,	,,	..	,,	0·000958
,,	60%	,,	,,	,,	..	,,	0·00082
,,	45%	,,	,,	,,	..	,,	0·000615
,,	20%		,,	,,	..	,,	0·000272

QUANTITY OF SPIRITS WHICH MAY BE SOLD BY A CHEMIST WITHOUT LICENCE.

In view of the Immature Spirits (Restrictions) Act, 1915, the Commissioners of Customs and Excise reduced the quantity of duty-paid Spirits of Wine (including Absolute Alcohol), which may be sold without a licence, to 5 *ounces fluid*. Strict inquiries should be made by the pharmacist as to requirements.—P.J.i./22,505.

General References to Treatment, etc., with Alcohol

Physiologically it is narcotic and antipyretic, not stimulant.

1½ ounces of pure alcohol is all that can be utilised as a food in the human body per diem=3 ounces of brandy and whisky=7 ounces sherry=15 ounces champagne, claret and white wines.

Even in small quantities is injurious to the proper working of the brain (Victor Horsley).

In favour of Alcohol in moderation. The 'power of unlocking energy exerted by Alcohol' is one of the themes.—Charles Mercier, L. ii./12,1492.

90% of the crime of this country depends upon intemperance.—Lord Alverstone, L. i./13,197. See also *ibid* 1351, 1503; B.M.J. ii./12, 1557; Sweden's Gothenburg System.—ii./13,1107.

Fatigue and alcohol. Review of labour conditions in various trades. Effects of alcohol worse than useless.—A. F. S. Kent, L. ii./17,107.

Alcohol and Arteriosclerosis.—The majority of clinical observers assume that excess in alcohol raises blood pressure and hence predisposes to arteriosclerosis, but the pharmacological action of Alcohol is complex,—while it increases force and frequency of the heart's beat it relaxes the peripheral arterioles. There are stages of intoxication in which vascular stress is doubtless increased, but this is by no means the universal effect of Alcohol. It is argued, and this also refers to tobacco smoking, that it is the sudden changes in blood pressure induced by the drugs in question, which exert the stresses leading to arterial damage, and it is possible that the argument is a good one. The registered cause of about 1/3rd of the total deaths in the age period 55 to 65 was disease of the heart and blood vessels.—F. W. Andrews, L.G.B. Rept. per P.J. ii./12,739.

Champagne injections in Surgical Shock. Transfer contents of a small bottle (about 400 Gm.) into an ordinary 500 Gm. serum bottle and add Normal Saline 100 Cc. Inject subcutaneously in the normal manner and repeat in six hours if necessary. If a prompt evacuation of the bowels is required give an injection of Pituitary Extract and if necessary repeat in three hours. Valuable in certain cases of pneumonia, influenza, etc.—L. i./13,1416.

Alcohol Injection in Neuralgia.—

Intractable trigeminal neuralgia or tic doloureux treated by Alcohol injections, (80% usually employed) around the supraorbital notch 112 cases. Give Hyoscine 1/150 grain and Morphine ¼ grain 20 minutes in advance. Prior to the Alcohol a few drops of 3½% Eucaine to assist in locating the nerve trunks.—Wilfred Harris, L. i./13,881.

Freedom from neuralgia may be practically guaranteed for 12 months if the nerve has been properly hit and immunity for years has been secured.—Wilfred Harris, L. ii./22,122.

Trigeminal neuralgia. Alcohol injections give relief lasting about 11 months.—Sir W. Thorburn. Pr., May, 1921, p. 316.

Danger of injections for neuralgia. Novocaine preferable to general anæsthetic.—L. ii./23,1407.

Dysphagia of laryngeal tuberculosis has been treated by injections into the sensory nerve of the larynx of 1 Cc. of 80% Alcohol containing 2 grains of β. Eucaine Hydrochloride per ounce.

Acute forms of inflammation of the womb and ovaries and general inflammatory conditions of the female genital organs, have been treated by abdominal compresses, first of alcohol 60% strength, and afterwards with 90%, together with vaginal tampon 30% strength.

In pneumonia the routine use of alcohol especially in early stage with idea of preventing cardiac failure is a serious error.—Yeo.

For dietetic use the alcohol from grapes is purest; from corn is next best; from beetroot may be impure; and from potato the most dangerous.—W. W. W.

Sterilise substances insoluble or only slightly soluble in alcohol with it.—Charles Wray.

Typhoid (especially of children) has been treated by compresses of Alcohol by means of a layer of absorbent cotton or folded gauze large enough to cover the abdomen entirely, these are covered with a compress of cold water with impermeable tissue above. The water is renewed hourly—the alcohol is left several hours.

In skin affections, especially syphilis, acne rosacea, psoriasis,

erythema, and angio-neurotic oedema, alcohol has been applied to the part. Locally it is often useful.

Moderate doses of alcohol may help the digestive process by increasing the activity of the gastric movements and promoting absorption (*cf.* our Pepsin experiments, *Vol. II.*). It also increases the rapidity of absorption of potassium iodide. Neither the intake of oxygen nor the output of carbonic acid gas is altered by alcohol, therefore as it has been oxidised in the body it saves tissue and is a food.—Hale White.

It is in condition just short of health—in old age, over work and fatigue—that the beneficial effects of alcohol become most marked. The moderate use of alcohol in health is harmless, if not indeed actually beneficial. The effect of wines on pancreatic digestion is akin to their action in the mouth (*i.e.* retarding the conversion of starch), and may be entirely explained by their acid qualities (out of all proportion to their alcoholic content), but by the increase of appetite and gastric secretion which they induce, they may, in moderate quantity at least, not only neutralize any inhibition of the merely chemical processes which they exert, but actually render digestion quicker and easier than it otherwise would be. This, indeed, is one of the most useful actions of wines both in health and disease.—Hutchison.

Action of Alcohol on the human economy. Given therapeutically it must be well diluted. In diabetes it ought to be diluted down to 5 or 6% strength and in small doses.—E. Mellanby, B.M.J. ii./22,195.

The murderers and cut-throats in Ireland, Russia and elsewhere are largely teetotalers. Present day unrest attributed to expensiveness of Alcohol. Would be sorry to see the moderate use of Alcohol abolished in this country.—Sir J. Barr, B.M.J. ii./22,199.

Table showing proportion of accidents in Germany and Austria as also convictions for assaults, drunkenness, etc., greater on the Monday than other days. Prohibition in U.S.A. is increasing industrial efficiency.—E. L. Collis, B.M.J. ii./22,244.

Alcohol as a Drug of Addiction. Prohibition in other countries has led to other and worse addictions and industrial unrest.—W. E. Dixon, B.M.J. ii./21,822.

Venereal disease in relation to Alcohol. A predisposing factor.—L. W. Harrison, L. ii./22,942.

Prof. Starling holds, in moderation, it does not shorten life as compared with total abstinence.—L. ii./23,983.

Prolapse of rectum treated by injecting 1·5 Cc. of absolute alcohol on each side or into the peri-rectal tissue at a depth of 2 to 2½ inches. —L. Findlay and J. B. Douglas Galbraith, L. i./23,76.

Alcohol for Burns.—If patient is in such a state of shock that he cannot stand an anæsthetic, a Saturated Aqueous Solution of Picric Acid is used on lint,—covered with protective. This is the usual procedure but the Acid may cause toxic symptoms. This worker has not found Picric Acid treatment satisfactory. It is better to cleanse the burns with Alcohol (70%) under Chloroform anæsthesia. The whole surface of the burn and surrounding skin is rubbed vigorously with the dressing. Blisters are rubbed off with all dead tissue (better than using scissors and forceps). After cleansing, a dressing of sterile gauze wrung out of the Alcohol is applied, over this dry gauze and wool : repeat.—L. i./13,705.

Spirit-Glycerin. — For Wounds Spirit and Glycerin alone or charged with antiseptics, *e.g.* Biniodide Spirit, Glycerin and Ichthyol

act like hypertonic saline in producing free discharge and require frequent changing. Not so painful as Iodine.—A. Don, B.M.J. i./16,648.

ALCOHOLISM, ACUTE, TREATMENT OF, *see* **Poisons and Antidotes.**

REFERENCES TO TREATMENT OF INEBRIETY.

"Drunkenness often chooses for its victims not the men and women originally the worst, but persons of strong social susceptibility and open in special respects to temptation."—Gladstone at Liverpool, 1893.—B.M.J. i./11,515.

Habitual Inebriety is an evidence of an unsound mind rather than a cause of it.—C.D. ii./13,1259.

The majority of insane inebriates have become alcoholics because of congenital defects or tendency to insanity, not insane as a result of alcoholism Alcohol, more of a coefficient than an actual cause of insanity,—this is, however, disputed by others who say that Alcohol is the direct cause in a large proportion of cases.—B.M.J. i./11,1383.

Pharmacology of Alcohol—best looked upon as a drug.—R. B. Wild.—L. ii./18,623.

Ammonium Chloride in doses of 30–60 grains with copious draughts of water is a suitable antidote to alcohol. The administration of smaller doses may be continued. It prevents the effects of alcohol, sobers the patient quickly and is a valuable preventive against delirium tremens.

For **McBride's treatment,** *see* **Atropine.**

For the "**Normyl Treatment,**" *see Vol. II.*

ALCOHOLISM, ACUTE, TREATMENT OF, *see* **Poisons and Antidotes.**

Spiritus Vini Gallici.

Brandy. Contains 40 to 50% (or 60% in case of good Cognac) by volume of alcohol. Contains 0·6 to 1·2% Extractive, 0·3 to 0·8% sugar, 0·08% compound ethers and yields 0·01 to 0·02% ash.

An ounce of brandy yields 100 calories of energy.—Hale White.—*cf.* Nutrimenta.

Brandy Sterules, Hypodermic. Convenient for the emergency bag. Contain 1 drachm.

Spiritus Frumenti. Whisky prepared by distillation of fermented grain—barley, wheat, rye, Indian corn. Sp. Gr. is usually about 0·925, contains 37 to 47% by weight (44 to 45% by volume) of alcohol.

For Amounts of Alcohol in various Wines and Spirits see Vol. II.

Eau de Paris. *Syn.* **Spiritus Coloniensis.**

Oil of Bergamot 20, Oil of Lemon 20, Tincture of Musk (1 in 50 Alc. 45%) 5, Oil of Neroli 2, Oil of Cinnamon 1, Oil of Cloves 1, Oil of Rose 1, Alcohol (90%) 1,800 Distilled Water 150 (all by weight). Macerate for 8 days, and filter.

Spiritus Myrciæ, Bay Rum, U.S., 1890.

Oil of *Myrcia acris* (*Myrtaceæ*) 16, Oil of Orange Peel 1, Oil of Pimento 1, Alcohol (94%) 1,220. Mix, and add gradually Water to 2,000. After 8 days filter. Of considerable renown as a **Hair Lotion.**

Another formula is :—Oil of Bay 5, Oil of Pimento 1, Oil of Orange 1, dissolved in Alcohol 400 then add West India Rum 200 and Water 400. History of Bay Rum.—P.J. i./11,655.

Aqua Mellis, Honey Water.

Yellow Sandal Wood, in shavings, 16, Alcohol (90%) 640. Macerate 7 days, and pour off the alcohol. Add to the marc, Concentrated Rose and Orange Flower Waters, of each 160, shake well,

decant, and add to the alcohol set aside. To this mixture add English Oil of Lavender, Oil of Cloves, of each 2, Oil of Bergamot 1, Oil of Nutmeg, Oil of Sandal, of each $\frac{1}{6}$.

Alcohol Allylicum, $CH_2 : CH.CH_2.OH = 58{\cdot}063$.

A colourless liquid miscible with water, with a pungent odour and burning taste. It inhibits bacterial growth. Investigation of Allyl Compounds. *cf.* Sinapis Chapter and Oleum Allii.

Open chain derivatives containing unsaturated carbon atoms are ***more toxic*** than isomeric saturated bodies. Thus Allyl Alcohol is fifty times more toxic than normal propyl Alcohol. In such bodies the combining energy of every atom in the double linking is not completely absorbed. The atoms possess a partial valency—hence the reactivity (Thiele).—O. C. M. Davis, B.M.J. ii./22,12.

Alcohol Amylicum. (*Off.*). $C_5H_{11}.OH = 88{\cdot}111$.

Consists principally of primary iso-amylic alcohol. $(CH_3)_2CH—CH_2—CH_2.OH$.

It is prepared by purifying and fractionating fusel oil, collecting that distilling between 257° and 289° F. (125° to 143° C.). Closer range of boiling points has been recommended. If B.pt. 128°—130° C. Sp. Gr. is commercially about 0·833 at 15° C.

Alcohol Methylicum, $CH_3.OH = 32{\cdot}037$. **Pyroxylic Spirit.**

Dose.—30 to 60 minims (**2 to 4 Cc.**).

If absolute and "acetone-free" has Sp. Gr. 0·796, but is not allowed by the Excise to be retailed pure unless duty-paid. Has been used internally for vomiting of pregnancy, sometimes combined with menthol. The commercial substance known as **Wood Naphtha, or Wood Spirit,** is 60 to 90% pure and contains acetone and other empyreumatic impurities. A purer preparation used in the arts has Sp. Gr. 0·81. It is a solvent of pyroxylin. The Methylated Spirit licence is not necessary for the sale of Wood Spirit, but that licence does not, of course, cover the sale of pure Methyl Alcohol.

Wood Alcohol Poisoning is generally accompanied by blindness. The end product excreted by the kidneys is Formic Acid. This reduces Fehling's Solution so its presence may interfere with diagnosis.—S. L. Ziegler, L. ii./21, 618. It is said that blindness may follow even 7 or 8 Gm. of it but the toxic dose is less. Numerous references to the subject in last edn., p. 121.

Fumes of Methyl Alcohol killed rats exposed to them in one or two days.—C. D., July 29/22,159.

Methylated Spirit Drinking.—Memorandum dealing with resolutions under consideration by the Convention of Royal Burghs anent the prevalent evil of Methylated Spirit intoxication. Complicated regulations proposed by the Convention, under police control.—P. J. i./22,387. M.O.H. for Edinburgh stated large quantities were supplied.—C.D., Apl. 2/21,448/449.

For Detection of in Ethyl Alcohol, etc., see Vol. II

Spiritus Methylatus, Mineralised or Denaturalised.

Since May, 1924, this consists of a mixture of Spirit 90%, Wood Naphtha (Methyl Alcohol) 9.5% and crude ***Pyridine*** 0·5%, with in addition $\frac{3}{8}$% (0·375%) of mineral Naphtha ('Petroleum') and a small proportion of Methyl Violet to colour. ***Caution.***—It is not well adapted for local use—*e.g.* for bed-sores. It forms an opaque mixture with water, and it is *incompatible* with Picric Acid—P.J. ii/24,159. We have confirmed this.

During the War (as from June 1st, 1918), the component parts of **Mineralised Methylated Spirit** were 95% Spirits, 5% Wood Naphtha, $\frac{1}{2}$% Mineral Naphtha with 0·025 of an ounce of Aniline Dye (Methyl Violet)

for each 100 gallons of Spirits. The composition of **Industrial Methylated Spirits** was for "**Ordinary**" 97½% of Spirits, 2% Wood Naphtha and ½% Mineral Naphtha, and for "**Special**," 97% Spirits and 3% Wood Naphtha. These provisions were temporary only.

The use of Methylated Spirits in the preparation of any article capable of being used internally as a medicine or wholly or partially as a beverage is forbidden. Its use is permitted by general order of the Board of Customs and Excise in making Linimentum Saponis, Compound Camphor Liniment, and Aconite and Belladonna Liniments.

Duty free (plain) Spirit can only be obtained by Universities and similar Training Institutes and by Manufacturers of certain chemicals and substances for which Methylated Spirits are proved to be detrimental. The question of increased cost in manipulation has no weight in the eyes of the Board of Customs and Excise

Industrial Methylated Spirit was introduced by the provision of the Revenue Act, 1906. This is simply a mixture of plain 'Spirits' with one-nineteenth of its bulk (5% of its volume) of Wood Naphtha (Methyl Alcohol) and is obviously considerably purer and of greater utility for manufacturng purposes. The Mineralised Methylated Spirit is retained, but the old name 'ordinary' Methylated Spirit should be dropped as the **Industrial Methylated Spirit** has taken its place. **Industrial Methylated Spirit** can only be used by a Manufacturer on giving a Bond, *i.e.*, if, as would probably be the case, more than 50 gallons per annum is used—less than 50 gallons do not necessitate a Bond.

The Act provides for the use of Industrial Alcohol in the composition of Soaps, Compound Camphor Aconite and Belladonna Liniments of the B.P. It is less irritating than the old Ordinary Methylated Spirit. The Board allows *these liniments* but not *the indiscriminate use* of the Industrial Spirit.

No person may receive it without the authority of the Board. It *may in no circumstances be used* for any purpose *except those for which the Commissioners* have specifically authorised *the user to employ it.*

The regulations governing the use of Industrial Spirit are prescribed by the Commissioners of Inland Revenue under Authority of the Spirits Acts, 1880. Iodine in Industrial Spirit not permitted.—B.M.J. i./14,1200.

It is illegal to dispense the Industrial Spirit even on a doctor's prescription, e.g., for a cooling skin lotion.

Use of Mineralised Methylated Spirit in Medical prescriptions:—

The Revenue Act, 1906 (Statutory Rules and Orders, 1906, No. 622, Part III.), contains the following:—

Clause 13. A retailer of methylated spirits must not use methylated spirits in any art or manufacture carried on by him *unless he has been authorised to do so.*

The Board of Customs and Excise in 1913 (P.J. ii./13,343) *however, made a concession in respect of medical men's prescriptions. The wording of this concession is that "Mineralised Methylated Spirit may be used by registered chemists and druggists in the preparation of lotions for external use, when prescribed by duly qualified medical practitioners" but chemists are liable to the penalty imposed by law if the Methylated Spirit is used in any preparation capable of being consumed as a beverage, or used internally as a medicine.*

Not more than 4 gallons of methylated spirit may be sold to any one person at one time on one day, and not more than 200 gallons may be kept in stock by licensed retailers, nor may it be sold between the hours of 10 p.m. on Saturday and 8 a.m on Monday.

Industrial Methylated Spirit. *Amounts used* in the United Kingdom during the years ending March 31st, 1913 and 1914: For Ether making 198,000 gallons and 230,000 gallons, for Chloroform 5,000 and 3,000 gallons, for Alkaloids and Chemicals 32,000 and 37,000 gallons, for Varnishes 980,000 and 1,100,000 gallons approximately respectively.—P.J., i./15,698.

"**Power-Methylated Spirits**" was introduced in the Finance Bill, 1920.

Duty Free Alcohol, other than Mineralised and Industrial Methylated Spirit, is obtainable by permission of the Commissioners for use in any art or manufacture in which the spirit is required and where it is proved to their satisfaction that Methylated Spirit is unsuitable or detrimental. A bond must be given and the *attendance of a Revenue officer* to witness the denaturing of such supplies is requisite.—Board of Customs and Excise, per P.J. i./15,34. *See also* P.J. ii./14,316,339.

Alcohol 75% (about 5 volumes of 90%, or of Methylated Spirit, to 1 of Water) is used for sterilising the skin and instruments.

Denaturalised spirit in Germany contains 2½% of a mixture of wood spirit 80 parts, pyridine bases 20 parts. (This amounts to 0·5% 'Pyridine' as in our new (1924) Methylated Spirit.)

U.S. gives a method of detecting Methyl Alcohol.

Lotio Evaporans, St. M.'s H. Methylated Spirit 1 drachm, Solution of Ammonium Acetate 1 drachm, Water to 1 ounce.

Antidotes.—In America poisoning by so-called deodorised spirit is common. In acute poisoning treat by rectal injections and stomach pump.—Give brandy, strychnine or coffee.

Further, for the subsequent amaurosis give pilocarpine and potassium iodide, and later strychnine hypodermically or *per os.*

Treatment: Pilocarpine sweats with Potassium Iodide or Sodium Salicylate in the early stages and full doses of Strychnine hypodermically when optic atrophy sets in.—B.M.J. ii./06,1855.

ALCOHOL ISOPROPYLICUM.

Syn. Secondary Propyl Alcohol, Dimethyl Carbinol. Avantine, $CH_3.CH(OH).CH_3$=60·079.

A colourless liquid with spirituous odour and somewhat burning taste. In the anhydrous condition it has Sp. Gr. 0·789 at 15·6° C. and B.pt. 82·4° C. Commercially, it is available admixed with water. A mixture containing 95% to 96% of the Alcohol has Sp. Gr. 0·810. [Our examination of the 95% article (British made) of commerce showed Sp. Gr. 0·8135. It distilled chiefly at 81° C.]. It is miscible with water or Ethyl Alcohol in all proportions.

Preparation.—It may be made on synthetic lines, *e.g.*, by reducing Acetone, using Sodium Amalgam, or by treating Propylene, in the Petroleum Industry. The latter is less pure.

The following notes have appeared regarding its manufacture:

Production as a by-product of the Petroleum Industry in the U.S.A. The method is to absorb the olefine gases, containing Propylene in Sulphuric Acid and hydrolise the resulting Alkyl-sulphuric Acids:

$$CH_3.CH:CH_2 + H_2SO_4 = CH_3.CH(OSO_3H).CH_3$$

Propylene — Isopropyl Sulphuric Acid.

$$CH_3.CH(OSO\ H).CH_3 + H_2O = CH_3.CH(OH).CH_3 + H_2SO_4.$$

The rectified product contains 91% of the Alcohol and Sp. Gr. 0·819. It cannot be concentrated by simple distillation beyond a certain point, but with dry Caustic Soda it can be made anhydrous.—H. D. Grant and C. O. Johns, Am. Jl. Ph., June, 1922, P.J. ii./22,272;

Chemical Examination.—Iso-propyl Alcohol, unless supplied as a commercial one, should be free from Acetone, Petrol hydrocarbons, leave no residue on evaporation and contain no added perfume. The Petrol product of commerce certainly has Petrol odour and taste.

To test for Acetone employ Rothera's Test, *vide* Vol. II.

Pharmacology.—Isopropyl Alcohol is twice as toxic as Ethyl Alcohol intravenously in cats. Vapour of Isopropyl Alcohol did not kill rats exposed to fumes (*cf.* Methyl Alcohol). 50 Cc. given *per os* to a dog weighing 6·5 kilo. caused serious incoordination, but the animal completely recovered. Applied to wounds in concentration up to 50% allowed same to heal normally.—P.J. ii./22,272.

It is stated to be less toxic than *n.*-Propyl Alcohol. Administration by mouth produces narcosis, in larger doses anæsthesia, finally coma and death. Very little is absorbed by inhalation or through the skin.—J.C.S.A., 1922,1093.

Uses.—It is safe internally in small doses in dilute form, and should be useful to make tinctures of drugs. It has been suggested as a surgical antiseptic and could, no doubt, replace Ethyl Alcohol in many surgical and medical procedures. In commerce, it is also suited as a solvent for crystallising and extract manufacture. (Note :—Its boiling point is only 2° to 3° higher than Ethyl Alcohol), and it has the advantage in perfumery and in the culinary arts (flavouring essences) in avoiding excise requirements.

Externally, it has been found harmless to the skin and hair, and within reason it can be inhaled mixed with air.

Acne of face, complicated with severe seborrhœa, treated by 35% solution two or three times a day. Non-irritating—also good in prurigo, pityriasis and seborrhœa of the head.—B.M.J.E. ii./21,85.

The above remarks apply, it should be noted, to isopropyl Alcohol. The isomeric NORMAL PROPYL ALCOHOL (*Syn. Primary*) $CH_3.CH_2.CH_2.OH$ *obtained from fusel oil is more toxic and unsuited for making tinctures and the like.*

'Isopropyl' Tinctures and **Spirits.**—We have made and examined (1923–24) samples of the following, keeping the content of active ingredients the same as those in the *Off.* Tinctures, and assaying where necessary. In each case the brand known as 'Avantine' was used.

The object was to determine whether Isopropyl Alcohol has a power equal to Ethyl Alcohol to extract the drugs. The percentages of extractive 'Residue' obtained in our laboratories are arranged beside similar data recently obtained in respect of *Off.* Tinctures.

To those conversant with this type of work, these figures are evidence of the suitability of Isopropyl Alcohol—the slight differences in figures as compared with the *Off.* Tincture figures, are justifiable. It is of interest to remark that few figures for 'Extractives' have been published in respect of the 1914 B.P. Tinctures while in past years as applying to the '98 and '85 Tinctures, the subject was much discussed by Pharmaceutical chemical houses, and in passing, we may add that B.P. tinctures made with authentic samples of drugs yield very considerable differences in extractive content.

ISOPROPYL TINCTURES.

Tinctura.	Strength used %.	% Extractive Residue.	% Extractive Residue from B.P. Tincture.
Asafetidæ	70	8·5	9·8
Aurantii	90	3·6	2·7
Benzoini Composita.	90	18·2	17·1
Calumbæ	60	1·0	1·5
Camphoræ Comp. ..	60	Satisfactory solution.	
Cantharidini. ..	90	Satisfactory solution.	
Capsici	60	1·6	0·6
Cinchonæ Comp. ..	70	3·9	4·4
Colchici	70	2·7	2·3
Ergotæ Ammoniata	60	4·4	4·0
Guaiaci Ammon. ..	90	15·1	17·0
Hyoscyami	70	2·4	2·5
Iodi Fortis.	90	Satisfactory solution.	
,, **Mitis.**	90	Satisfactory solution.	
Limonis	90	2·1	2·3
Nucis Vomicæ. ..	90	Satisfactory solution.	
Pruni Virg. ..	90	15·0	13·0
Quininæ Ammon. ..	60	Satisfactory solution.	
Tolutana.	90	8·1	9·0
Valerianæ Ammon.	60	2·8	3·4
Belladonnæ	70	The alkaloidal content of the strong tinctures made by *Off.* directions but using isopropyl Alcohol is amply sufficient to allow of dilution to *Off.* strength.	
Cinchonæ	70		
Opii	90		

All these tinctures resemble the B.P. preparations with the exception of a slight distinctive taste; this is not noticeable when the preparations are diluted. The characteristic smell of the freshly prepared tinctures due to the isopropyl alcohol, entirely disappears after about 4 to 6 weeks.

ISOPROPYL SPIRITS.

Spiritus.	Strength.	
Ætheris.	1 in 3	Sp. Gr. within B.P. limits
Anisi	1 ,, 10	See Notes below.
Cajuputi.	1 ,, 10	
Camphoræ.	1 ,, 10	
Chloroformi.	1 ,, 20	
Cinnamomi	1 ,, 10	
Juniperi.	1 ,, 10	
Lavandulæ.	1 ,, 10	
Menthæ Piperitæ. ..	1 ,, 10	
Myristicæ.	1 ,, 10	
Rosmarini.	1 ,, 10	

All the above dissolved easily and gave good, clear solutions except Spiritus Juniperi. All appear to be miscible with Isopropyl alcohol in all proportions except Spiritus Juniperi and Spiritus Myristicæ.

The general conclusion to be drawn from this investigation is that *iso*-propyl Alcohol is a suitable menstruum and solvent and can be used to replace Ethyl Alcohol for drug extraction and for dissolving volatile oils.

The procedures are at present illegal for *Official* preparations.

ALDEHYDA.

Aldehydum Absolutum. *Syn.* **Acetaldehyde** $CH_3.COH.=44{\cdot}042$.

A colourless mobile liquid, irritating when inhaled. Sp. Gr. 0·7876 at 16° C. B.Pt. 21° C. Becomes acid on keeping exposed to air—oxidation to acetic acid. Polymerises with rapidity in presence of sulphuric acid at atmospheric temperature into paraldehyde (*vide infra*), but if temperature be below 0° C. crystalline **metaldehyde** is formed.

Aldehydum Dilutum.

Contains 15% in Alcohol, is neutral to test paper, and has an ethereal suffocating odour, producing spasm of the glottis when respired. Diluted 1 in 1000 with water at 140° F. has been used as inhalation in catarrh and ozœna.

Paraldehydum $(CH_3.COH)_3=132{\cdot}126$. (*Off.*). **U.S.**

Dose.—30 to 120 minims (**2 to 8 Cc.**), or more, in diluted syrup or almond mixture, repeated if needed in ½ an hour. (In the knowledge of the writers ½ ounce has been given—this is probably a maximum single dose.)

A colourless liquid, crystallizing below 50° F.; Sp. Gr. 0·998; may be obtained by treating Aldehyde with dilute sulphuric acid. ***Soluble*** 1 in 10 of water and in all proportions in alcohol 90%.

Uses.—As a sedative, resembling Chloral, but without action on the heart. In spasmodic asthma it relieves spasm and induces sleep. Intravenously it is an Anæsthetic and Hypnotic. *v. infra.*

Flavoring.—Prescribed as Elixir or Mistura Paraldehydi *q.v.* Extractum Glycyrrhizæ Liquidum covers the taste.

Elixir Paraldehydi.

Dose.—1 to 3 drachms (**4 to 12 Cc.**).

Paraldehyde 240, Glycerin 240, Alcohol (90%) 480, Oil of Cinnamon 4, Oil of Bitter Orange 8, Saccharin 1.

Strictly speaking, however, alcohol is physiologically incompatible with paraldehyde.

Mistura Paraldehydi.

Paraldehyde 2 drachms, Essential Oil of Almonds (*sine* Acid. Hydrocyanic) 3 minims, Syrup 1 ounce, Liquid Extract of Liquorice 2 drachms, Water to 4 ounces. This covers the nauseous taste to some extent and forms four doses of ½-drachm or two doses of 1 drachm. The following are preferable :—

Paraldehyde Capsules, 20, 30 and 40 minims.

Dose.—1 or more.

Paraldehyde is diuretic but does not affect the skin, nor give rise to digestive disturbances or headache. Is satisfactory as an enema.

Occasionally it produces slight excitement and vomiting.

A case is recorded of three and a half ounces taken in error; 9 hours afterwards strychnine hypodermically and ammonia applied and injected, recovered consciousness in 34 hours. Two ounces have proved fatal.—W. W. W.

In delirium tremens the safest hypnotic is paraldehyde in doses of 100 minims.—Whitla, Pract. Med.

Mistura Paraldehydi et Potassii Iodidi.

Dose.—1 drachm (4 Cc.).

Paraldehyde 1·25, Potassium Iodide 0·92, Liquid Extract of Liquorice 6·25, Water to 100.

In broncho-pneumonia and capillary bronchitis of infants valuable. The constituents of the mixture are incompatible, free Iodine being formed but not sufficient to harm. In severe cases the secretions dry up remarkably.

Intravenously as Anæsthetic.—Deep anæsthesia can be very rapidly produced,—hypnotic effect is excellent. It is well to give with an equal amount of Ether. The action of the drug is very rapid, hence best given diluted. 5 to 15 Cc. of Paraldehyde is mixed with equal quantity of Ether; this mixture is dissolved in 150 Cc. of cold solution of Sodium Chloride (1%) in sterile water. Inject the solution cold or at not exceeding 25° C. Fildes and McIntosh's Injection Apparatus is used. Five seconds after injection the patient tastes Paraldehyde; in 40 seconds unconsciousness occurs, and in 90 seconds the corneal reflex is absent and anæsthesia complete. By this time 5 to 10 Cc. of Paraldehyde will have been given, and some minor operations may be performed, but as the drug is rapidly excreted by the lungs usually the whole 15 Cc. will be required. The method is practically safe and it has been used in cases of grave cardiac and pulmonary disease with perfect success.— H. L. C. Noel & H. S. Souttar.—L. ii./12,818. Suitable for minor surgical work.—H. L. C. Noel, L. ii./12,1221.

Tetanus treated by injecting Paraldehyde and Ether 5 to 15 Cc. of each in 150 Cc. of Saline, intravenously. Some septic tuberculous sinuses which complicated the case healed and the boy was discharged well. The treatment acts both as an anæsthetic and hypnotic. One could probably start with the larger doses straight away.—Oliver Atkey, L. i./13,168.

Paraldehyde 1 drachm, Ether 3 drachms, and Liquid Paraffin 4 drachms, given *per os* produced sufficient analgesia to permit of dressing of painful wounds.—J. T. Gwathmey and H. T. Karsner, Jl.A.M.A., April 6th, 1918; L. i./18,711.

Aldehydum Formicum. H.COH.=30·021.

Formic Aldehyde in vapour is an active antiseptic, preventing decomposition and fermentation, while it is comparatively non-poisonous.

Liquor Formaldehydi. (*Off.*). U.S., P. Belg., Fr. Cx., P. Jap.
Syn. Formalin, Formol, Methanal, Methyl Aldehyde Solution.

Patent: A patent was granted 7038/1893 for the 40% solution described as a New Antiseptic material. ***Expired*** 1900.

Trade Mark: An application to register the word "formalin" was refused in 1900 on the ground that it was the name of the patented article.—C.D.

Dose.—1 minim, *internally*, well diluted. *Hypodermically, vide* References, *infra.*

Wiley gave 0·1 to 0·2 Gm. daily in an investigation.—*Cf.* Vol. II., *Milk Preservatives.*

An aqueous solution of Formic Aldehyde, containing 36 to 38% *w/v.* Sp. Gr. 1·079 to 1·081. (35% by weight=38% by volume.) Assay method by means of sodium hydroxide and hydrogen peroxide is given—(*Off.*). P. Jap. has also **Aqua Formalinata** 1 in 35 of the 35% preparation.

Manufacture by oxidation of methyl alcohol.

Note:—*Confusion arises with regard to prescriptions for this solution. It is to be understood that a* 1% *Solution of Formalin means* 1% *of the Commercial* '40%' *Formaldehyde Solution.* 1% *Solution of Formaldehyde means* 1% *of actual Formaldehyde H.COH.*

Antidotes.—Stomach tube and emetics followed by alkaline drinks, sal volatile (or ammonia in other suitable form), alcohol.

Uses.—For *wound treatment*, and for sterilising surgical instruments, and the hands of operators, *e.g.*, as FORMOSYL, *q.v.* Has been suggested, 1 or 2%, as a pigment and spray for *diphtheria*. Also as Glycerin Pigment 2% to the throat in *angina follicularis*, and as a lotion in *pertussis* 2% or less—with caution. See also Paraform. As compresses to *malignant tumours* 2% or stronger either as palliative, or prior to removal. For *alopecia* 10% or stronger. For *eye washes* $\frac{1}{20}$% has been employed.

Useful as a preservative for embalming and the preservation of corpses for dissection and for museum specimens generally—dilute about 10 times—to harden about 25 times, but for preservative purposes a far weaker solution is sufficient. It shrivels up soft corns causing them to drop off if applied daily. Under the name of **Durine** a preparation is made for this purpose.

For a common cold inhalation of 1% will cure.

Ophthalmia, trachoma (1 in 2,000 up to 1% used) and *sweating feet* are well treated by a lotion. *Ringworm, lupus, laryngeal growths* by pigment of 1 to 3 glycerin. A spray or douche is useful for *ozœna* (1 in 2,000 up to 1 in 500 with coarse spray). For puerperal fever uterine injection of 1 ounce of glycerin with 3% of Formalin. Also 1 minim doses *per os* have been practised.

Recurrent pleural effusion has been treated by intrapleural injection of Glycerin 1 ounce, containing 10 drops of Formalin.

Eczema in *dry* form should be treated with moist formalin application, *e.g.*, 1 of formalin (40%) in a starch and water jelly 99.

To eczema that is weeping, apply Lysoform or other formalin dusting powder. Staphylococci of eczema are killed by 1% 'Formalin.'—E. Blake.

Vegetable Infusions.—From 0·05 to 0·1% Formaldehyde is generally adequate to preserve.

For Room Disinfection and Utensils (in addition to **sunlight, fresh air and soap and water**) 1 or 2% Formalin as spray (coloured fabrics are not injured), or burn Formalin Disinfecting Tablets, *q.v.* As a wash up to 10% solution may be used. For furniture 1% would be suitable. Or simply *evaporate a pint of Formalin per 1,000 cub. ft. in an open vessel over a bunsen or spirit lamp.*

Fumigators, *e.g.*, **"Lister's,"** are made for room disinfection They are arranged to be lit at the bottom of the container whilst the fumigator stands on a tray with a little water. Formaldehyde is volatilised into the room and continues to be evolved for ½ hour. Windows, etc., to be pasted down in the usual way where complete disinfection is required, and clothing, etc., left exposed to the vapour for 3 or 4 hours.

For the use of **Formalin with Potassium Permanganate** *for Room Disinfection and for purifying utensils, also as Preservative of Foods, also for the Detection in Milk, Urine, etc., and for Method of Determination and its General Antiseptic Power, see Vol. II:*

References to Use of Formalin

Acute endometritis has been treated by injecting 50% solution of Formalin into the uterus and washing out again quickly. Not so dangerous as Zinc Chloride.

Epithelioma on the face has been treated by applying Formalin solution after using Cocaine. The treatment is repeated after four days—the scab comes off and the surface below cicatrises rapidly. There is no local reaction, but the method is only suitable for epithelioma not larger than a florin. A solution of 2% Formaldehyde is valuable in extensive and inoperable cases. It causes necrosis and elimination of neoplastic bodies without irritating healthy adjacent tissue or causing pain.

The strong preparation is also valuable in treating aphthous ulcerations of the buccal mucous membrane—the part is washed with a tampon soaked in it. *Use Cocaine first.*

Ringworm can be cured by painting with a soft camel's hairbrush with Formalin, meanwhile keeping the patch of skin in such a position that the solution will not run off it. One painting usually suffices. If skin greasy wash with Spirit first. May smart a little but otherwise rapid, clean and effective. Second application may be repeated in five days' time.

Keloid growing in the jewel holes in the tip of the ear treated by injection of Formalin,—5 minim doses. A number of these doses may be required according to size. Painful. Local anæsthetic or Chloroform is required. B.M.J. ii./13,811.

Formaldehyde Poisoning by drinking 3 ounces of 4% Formaldehyde. Unconsciousness occurred in three minutes. Treatment consisted in washing out the stomach with strong Saline Solution and later with a Solution of Ammonium Acetate. At the post mortem examination it was found that the interior of the œsophagus and stomach was extremely corroded.—B.M.J. ii./12,350, 1470.

Formaldehyde-Glycerin (2% Formaldehyde in glycerin) injected in tuberculous empyema. After removal of purulent material 1 to 12 ounces of this solution employed.—L. ii./21,770.

Bacillary dysentery treated by rectal injections of Formalin, 300 Cc. of 1% twice daily. Painful.—Schiff, Abst.Pres., Oct. 20,355.

Preparations of Formaldehyde.

Collutorium Formalini, R.D.H.

Formaldehyde Solution 18 minims, Peppermint Oil 5 minims, Alcohol (90%) 1½ drachms, Peppermint Water to 1 ounce. A few drops to ½ tumbler of water for use.

Gargarisma Formaldehydi.

Formalin Solution 1 minim to Water 1 ounce.

Nebula Formaldehydi.—C. Muthu's Inhalants.

Inhalant "A."—Chloroform 1 drachm, Menthol 10 grains, Pumilio Pine Oil 10 minims, Alcohol (90%) to 1 ounce, with 2½% Formaldehyde (in the form of gas).

Inhalant "B."—Guaiacol 1 drachm, Chloroform 1 drachm, Menthol 15 grains, Pumilio Pine Oil 15 minims, Alcohol (90%) to 1 ounce with 5% Formaldehyde.

Inhalant "C."—Guaiacol 2 drachms, Chloroform 2 drachms, Menthol 15 grains, Pumilio Pine Oil 15 minims, Terebene 1 drachm, Alcohol (90%) to 1 ounce.

Inhalant "D."—Guaiacol 2 drachms, Iodine 1 drachm, Terebene 1 drachm, Pumilio Pine Oil 15 minims, Chloroform 2 drachms, Alcohol to 1 ounce.

Dose.—About 10 drops of one of the above sprinkled on the inhaler every half to one hour, and used by continuous inhalation.

These inhalations are used progressively. After reaching "C," "D" is used as an alternate Solution or for night use.

During the period 1910–1911, about 50% of patients recovered under the treatment. Inhalants as above.—Pr., January, 13,134.

Strengths of Formalin admissible for Inhalation.

We instituted some experiments and found as follows :—

A plain 1% mixture of Commercial Formalin in 90% Alcohol (*i.e.* without Chloroform, etc.) could be tolerated without it being too irritating to the throat and nostrils.

A 5% mixture was too irritating for prolonged use by inhalation.

A 10% mixture was out of the question.

All the above were tried in an ordinary Burney Yeo Inhaler.

Formalin and Chloroform Solutions :—

No. 1. Formalin 5, Chloroform 15, Alcohol (90%) 80.

No. 2. Formalin 10, Chloroform 20, Alcohol (90%) 70.

No. 2 is only ventured upon where Formalin is well and easily endured. In the absence of the anæsthetic effect of the Chloroform patients were not able to bear even the mild preparation for any length of time. Results very encouraging.—H. Collier.

Formanilid. $C_6H_5NH.COH = 121{\cdot}099$. *Dose.*—2 to 4 grains (**0·12 to 0·25 Gm.**). Hypodermically 15 minims (**1 Cc.**) of 3% solution. Yellowish crystals soluble in water and alcohol, melting at 46° C. Employed in hæmorrhage and fevers. 20% solution said to produce local anæsthesia in 1 hour. 2 to 3% for urethral discharge.—M Am., 1907. To be distinguished from Formamid, $HCO.NH_2$.

✱ **Formosyl** (T.M. 293326) [✱Lysoform (Patent 7616/1900 now expired; Trade Mark 230544) is a similar preparation].—This preparation is a liquid formaldehyde potash soap. It is highly antiseptic, relatively non-poisonous, inodorous, deodorant and cheap; does not coagulate albumin, and is miscible with water and alcohol in all proportions. It combines the penetrating lathering action of soap with the antiseptic power of Formalin. A 5% solution is rapidly fatal to *B. typhi abdominalis*, *B. coli communis*, and the *Staphylococcus pyogenes aureus*, and a 3% solution destroys *B. anthracis* spores in 24 hours. A 2% solution is sufficient for general purposes and is better freshly prepared. For hand disinfection 1 to 2% is suitable. The stock bottles should be kept well corked.

Uses.—In using warm solutions a temperature of 40° to 50° C. should not be exceeded; ½ to 1% is suitable for irrigation of the vagina, uterus, abscess cavities, &c. Diluted it is useful for psoriasis, lupus, eczema, and as a wash for perspiring feet. Impetigo may be treated with 5% **ointment** combined with carbolic acid and ammoniated mercury, or same strength with zinc ointment (paraffin basis) for eczema. 25 to 50% ointments with lanolin basis are applied to ringworm and alopecia areata. A 10% **ointment** is used in psoriasis. 20 to 30% may be used to arrest sweating of the feet where of limited area. For seborrhœa a 10% ointment with 5% resorcin is useful. 10 to 15% in gall ointment is suitable for piles.

Formosyl Mouth Wash, Tooth Paste, Tooth Powder, Dusting Powder, for moist surfaces, bed sores and syphylitic ulcers, and **Toilet Soap** are prepared, also **Pessaries** of Cacao Butter, containing 2 grains each. In the sick room and operating theatre its deodorant properties will be evident. It cleanses suppurating wounds and has styptic action on bleeding surfaces. Two to 5% is also suitable for bites, stings and burns. It is valuable also for general household disinfection, for deodorisation and cleaning. Good results have been obtained with it in veterinary use.

Formosyl Mouth Wash. An efficient antiseptic. A small teaspoonful is added to the tumbler of water and used in the customary manner. Agreeably flavoured.

Dermatologists who treat the skin with lotions and ointments and leave the state of the mouth unattended to, are proceeding on the most unscientific lines. Eruptions on the head and face are frequently found in conjunction with an unhealthy condition of the teeth and gums.—L. i./11,1206.

***Formosyl Gargle**

This preparation contains Formalin, Phenol, Boric Acid, Essential Oils, etc. An antiseptic preparation suitable for use as a *gargle* or mouth wash.—1 tablespoonful with an equal quantity of water (preferably warm).

As Nasal Douche.—Dilute four to eight times.

The commonest avenue of rheumatic infection is the tonsil and next to it the nose. Irrigation and thorough cleansing of the nose and pharynx with an antiseptic lotion is essential routine in anti-rheumatic treatment. The paper entitled 'The Avenues of Rheumatic Infection,' is the outcome of examination of 75 cases of Sydenham's chorea. Of these 88% showed nasal and pharyngeal inflammations.—W. P. S. Branson, B.M.J. ii./12,1432.

℞ ℙ1 **Formosyl Dental Dressing** in paste form is prepared containing 6% Cocaine.

Formosyl Pastils are useful to allay irritation and are antiseptic.

Liquor Formaldehydi Saponatus (*Off.*), contains 20% of Formaldehyde Solution (*Off.*).

***Bacterol.** (T. M. 369724, Class 3, and 346029 and 367083, Class 2.) A brown coloured antiseptic solution containing Formaldehyde, Iodine and Infusions of Eucalyptus and Alpine peppermint made by special process. "Medical," "Aeriform," "Veterinary" and "General" are made. It is claimed to be non-poisonous, non-caustic and non-staining. Its efficiency is not reduced by presence of Albumen or organic matter.

For instruments 2 to 3%. For wounds, sores and burns, also for skin affections, *e.g.*, psoriasis, eczema, ringworm, *etc.*, 1 to 2 per 1000 warm solutions For obstetrical purposes warm injections of ½ to 1 per 1000. For urethral and bladder affections 1 per 1000 warm solution.

The aeriform variety is efficient for sterilising rooms. Anthrax spores *B. Coli*, Cholera vibrio and micrococcus pyogenes aureus on threads exposed in a room 10 by 12 by 9 ft. were killed after vaporising Bacterol for ½ hour and keeping the room closed for a further ½ hour.

Veterinary Bacterol is employed in 2 to 5 per 1000 warm solution. The **general** type is used diluted 2 to 5%.

Aniodol.—A solution of Formaldehyde in Glycerin, co ntaining some Allyl Sulphocyanide. As a disinfectant for instruments, etc., 1 in 500 dilution. As antiseptic to wounds, 1 in 4000. As a gargle, 1 in 2,000.

***Yadil** (T.M. 371511 Class 3, and 37152 Class 48).

Syn. **' Tri-Methanal-Allyl Carbide. '**

A water-white liquid having a slight allyl odour and a sweetish and pungent taste like Formalin. Sp. gr. 1·015. Neutral or very faintly acid.

Uses.—An antiseptic solution employed as a deodoriser and bactericide locally. For external use employ 1 in 300 as nasal spray, gargle or wash for offensive perspiration. Has been used for impetigo, acne, erysipelas, eczema and chilblains. For enemas and vaginal douches 1 in 150. For instruments 1 in 80.

Sir W. J. Pope found about 1% Formaldehyde, 4% Glycerin, with a minute quantity of either garlic or mustard Oil. Prof. Dixon also made indictments regarding its advertisement for cure of phthisis.—*Daily Mail*, July 22 and 23, 1924. It is very weak relatively to Carbolic Acid.—J. Eyre, *ibid* July, 26,'24.

Pasta Formalini, R.D.H. Thymol 1 drachm. Triturate thoroughly and add Paraform 3 grains, Glycerin 10 minims, Zinc Oxide 2 drachms. Mix.

***Paraform** (T.M. 216093) **Paraformic Aldehyde, Tri-oxy-methylene.** Fr. Cx. **Formaldehydum Polymerisatum, P. Belg.** $(H.COH)_3$.

Manufacture.—On evaporating aqueous Formaldehyde solution, Paraform $(H.COH)n$ throws out which on drying changes to $(H.COH)_3$—Trioxymethylene. Yield practically theoretical.

Patent. The C. & D. states this is probably the special form of polymerised formic aldehyde referred to in the " Eka-iodoform " patent (11228 of 1897) which is prepared by treating commercial Formalin solution with half its weight of concentrated sulphuric acid, at the same time cooling. The mixture is allowed to stand a few days and the precipitate washed and dried. This polymer behaves differently to the paraformaldehyde obtained by evaporating formic-aldehyde solution under the usual pressure or in a vacuum.

A polymer of formic aldehyde, in white friable amorphous masses, but slightly soluble in water, with an irritating vapour (Formaldehyde).

Heated by an enclosed spirit lamp, it sublimes, combines with the products of combustion, is converted into formic aldehyde, and is a convenient means of applying the latter in vapour as an antiseptic and disinfectant.

Room Disinfection: Sunlight, fresh air, soap and water and Formaldehyde are now relied on.—Tablets of Paraform 1 gramme, **Formalin-Disinfecting Tablets**, are prepared for use in a vaporiser or with an ordinary night light,—20 to 25 tablets per 1,000 cubic feet, the latter number ensuring thorough disinfection. Walls and furniture should first be sprayed with water.

They are also prepared of strength 0·1, 0·25 and 0·5 Gm. for disinfecting.

Employed against wrapped and unwrapped cultures of *B. Typhosus* in a brickwork chamber lined with white porcelain tiles small quantities of Paraform and Formaldehyde vapours were found to have the same destructive action, irrespective of association with aqueous vapour. It is not necessary to generate Formaldehyde

vapour from Formalin Solution, as Paraform can be more conveniently used in practice. The use of 20 Gm. of Paraform or an equivalent of Formalin Solution, *i.e.*, 1¾ ounces of the 40% article killed the organisms by two hours exposure. Mixed vapours of Sulphur Dioxide and Formaldehyde may have advantages to destroy, in addition to bacteria, vermin such as moths, fleas and bugs. The efficacy of Sulphur Dioxide, particularly when in association with aqueous vapour, was also clearly re-established. —C. T. Kingzett, H. F. Bottomley and J. E. Brimley, M.P.C. i./17,157.

Catheters may be maintained aseptic by wrapping in lint impregnated with 20% of paraform.

Paraform Collodion, 25% strength, applied three times a day to warts is efficacious.

Whooping-cough has been treated by inhalation of Formalin vapour—*i.e.*, from Paraform.

Insufflatio Paraformi. *Syn.* PARAFORM SNUFF.—Paraform 40, Ammonium Chloride 20, Lavender Oil 0·2, Menthol 0·5, Lycopodium to 100. This preparation should prove a useful nasal antiseptic. We found that Paraform as such, undiluted, can be tolerated by the nostrils without causing irritation or sneezing. If sneezing is undesirable the Ammonium Chloride must be omitted, also the Paraform may be reduced if preferred.

Mixtures of Paraform with Sodium, Barium or Strontium Peroxide, when brought into contact with water, yield formaldehyde vapour—subject of a patent.—P.J. i./07,472

✱**Formitrol** (T.M. 306254) **Pastilles** are stated to contain about ⅛ grain Formaldehyde' and are used for disinfection.

✱**Formolyptol** (T. M. 258031), is stated to contain Formaldehyde (0·2%) Aceto-boro-glycerin (5%) with the active balsamic constituents of Pinus Pumilio, Eucalyptus, Storax, Myrrh and Benzoin, is a colorless, fragrant, non-toxic, non-acid, non-irritant solution for use as a spray, gargle, in tampons, mouth wash, wet dressing, irrigating fluid, douche, or internally.

Formaldehyde Tablets for **internal** administration contain Paraform ¼ grain, Milk Sugar 2 grains, Citric Acid, Peppermint and Sugar, *q.s.* to 10 grains. Useful antiseptic to the mouth.

✱**Formamint Tablets** are said to contain 0·01 Gm. 'Formaldehyde.'

The Trade Mark 264704 was the subject of an application for avoidance in 1914, but the application was refused. In 1916, however, it was ***removed from the register.***—C.D., ii./16,1070.

See however Nos. 301695, 325119 and 335409.

They weigh 1 Gm. each, and are said to contain 2% of the compound $C_{12}H_{22}O_{11}$ $(CH_2O)_5 = 492{\cdot}441$.—P.J. i./07,4; ii./07,838.

Manufactured under patent No. 2672, of 1906, by mixing 1 mol. of Milk Sugar (or 1 by weight) and at least 5 mols. of Formaldehyde in solution (say 1½ by weight of 40%) and heating in vacuum to 60–70° C. to density 32° Beaume. Evaporated to dryness, the solid substance is odourless, *soluble* in water, Alcohol and Acetone, and decomposes with certain substances.—P.J. ii./06,554. This patent became void in 4th year. The Lactose and Formaldehyde in Formamint are *not* chemically combined. Mixtures of different proportions can be made. German Patent annulled.—Prof. Thoms, P.J., i./15,41.

Value as a mouth disinfectant questioned.—Pres. 1910, p. 20.

ALKALOIDAL NOTES.

'ACTIVATED' ALKALOIDAL SOLUTIONS.

The following are abstracts of papers which have appeared on this subject :—

The hydrochlorides or sulphates of Cocaine, Quinine, Cinchonidine Aconitine, Physostigmine, Pilocarpine, Morphine, Scopolamine and Dionine were tested for their toxicity on Tadpoles and Daphniæ with and without the addition of Sodium Carbonate, Trimethylamine, Pyridine, Nicotine or Piperazine, these bases being usually added in amounts equivalent to half the alkaloidal salt present. In general, the addition of a base to an alkaloidal solution was found to markedly increase the toxicity and decrease the surface tension. The result may be of clinical importance since it appears that the addition of Sodium Carbonate to alkaloidal solutions increases their pharmacological effectiveness.—J. Traube, Chem. Abstracts, 6 (1912), 2819.

Employing solutions of Physostigmine, Pilocarpine, Veratrine, Hydrastine, Hydrastinine, Narcotine, Berberine, Hydroquinine, Quinine, Strychnine, Codeine and Conine, similar conclusions were drawn by Helene Tschernorutzky, Chem. Abstracts, 7 (1913), 519.

Report of Committee on Local Anæsthetics for Ophthalmic Work.—The penetrating effect of Cocaine solutions is increased by addition of 0·5% of Sodium Bicarbonate. *Phenacaine* (Holocain) 2%—alkalis cause precipitation and should not be added. *Procaine* (Novocain)—efficiency is not increased by alkalis.—Chemical Abstracts, 16 (1922), 441.

Alkaloids such as Quinine and Atropine, having a molecular weight exceeding a certain limit, are found by the ultramicroscope to be present in (aqueous) solution in the colloidal state, while corresponding salts form true solutions. The surface tension of water is scarcely affected by alkaloidal salts, but a small quantity of alkali liberates the base which assumes the colloidal condition with diminished surface tension (and increased toxicity to small animals, as found by others). Quinine was found to be activated more than Atropine by alkali. The toxicity of some of the alkaloids (Quinine) is increased by boiling and subsequently cooling them and the authors found that corresponding alterations occur in the size of the particles, surface tension and toxicity. In a series of related alkaloids the toxicity and surface tension increase as the molecular weight falls, and even with alkaloids of different classes it is found that alteration in surface tension determines toxicity.—I. Traube and N. Onodera, J.C.S., A. i. 1915, 105.

H. W. Acton found Quinine is more toxic to Paramecium in presence of alkali.—L. i./22,126.

J. A. Sinton (1923) found Quinine gives better results in malaria when administered with alkalis than when given alone. (Indian Jour. Med. Research, vol. X., 850).

In experiments by T. A. Henry and H. C. Brown the protozoon used was a species of *Glaucoma*, a ciliate somewhat similar to, but smaller than, *Paramecium*. Enormous increase in toxicity of

Conessine Hydrochloride (from Holarrhena bark) to this organism was found in the presence of N/200 NaOH. The toxicity of Emetine Hydrochloride is somewhat increased, but not nearly to such a marked extent as that of Conessine. Quinine base was found to be more toxic to protozoa than the monohydrochloride, and both are more toxic than bihydrochloride.

These workers, dealing with the question as to why alkaloids are more toxic in presence of alkalis, point out as follows.

(*a*) Combination of alkaloid and alkali was excluded. Conessine with alkali is not more toxic to mice than Conessine alone.

(*b*) Enhanced activity not apparently due to action of alkali itself on the organism.

(*c*) Physical changes, such as surface tension, seem to be excluded by the fact that the action is restricted to free alkalis, salts of carbonates show only slightly increased toxicity. They conclude: "It seems clear that the *free alkaloid* exerts a direct toxic effect, and it is only after that effect has been produced that the alkali comes into play." (*The italics are ours*).

Attempts at markedly raising the alkalinity of the fæces, by taking alkalis by the mouth, failed. Slight increased alkalinity of fæces was found after large doses of Sodium Bicarbonate, heavy Magnesium Carbonate and Bismuth Carbonate. Rectal injection of an alkaloid with alkali would enhance chances of action.

The results of their work emphasize Acton's suggestion that for injection, Quinine base would probably be more efficient and possibly non-irritant if a means can be devised for injecting it in solution in this form.—Trans. Roy. Soc. Trop. Med. and Hygiene, 1923, Vol. XVII., p. 61.

It appears to us that this '**activation** in presence of alkali is dependent upon the following factors.

Some alkaloids are rendered more active than others, and this is probably due to their molecular structure.

The second point is that some of the workers seem to have ignored the fact that the alkaloidal ***bases*** have been liberated by treatment with the alkalis and *are present as such in solution.* In this connection, the following experiments which we have made are of interest.

Incompatibility of Cocaine Hydrochloride and other Alkaloidal Salts with Sodium Bicarbonate.

A somewhat extended investigation carried out in our laboratories by one of our assistants (L. H. Trace), under our direction in 1921, on the question of the incompatibility or otherwise of the salts of some of the alkaloids in certain conditions, with alkalis, notably with Sodium Bicarbonate, gave, as a general conclusion, the following:—

The alkaloidal salts employed were Cocaine Hydrochloride, Quinine Sulphate (in this instance with Sulphuric Acid, *q.s.*), Quinine Hydrochloride, Strychnine Nitrate and Morphine Acetate. As a general résumé of the results, it appeared that when the alkaloidal strength exceeded 0·25% (in water) precipitation of the alkaloids occurred from the salts in the presence of excess of Sodium Bicarbonate, and even in solutions in which no obvious precipitation took place, the free base existed in varying quantities (usually about 50% of that present).

Now we were informed that clinically, in certain procedures, a 0·5% Cocaine Hydrochloride solution with the addition of 0·5% Sodium Bicarbonate (*cf.* **Injectio Cocainæ et Sodii Bicarbonatis**) is more efficacious and anæsthetic in effect than even a 4 or 5% plain Cocaine Hydrochloride solution.

Experiment showed that practically the whole of the alkaloidal *base* in this solution can be extracted by a suitable solvent such as Chloroform. From considerations of solubility of the Cocaine, all the alkaloid can hardly be present as base, and we suggest that the solution contains an equilibrium mixture of Cocaine Base and Cocaine Hydrochloride according to the equation

$$C_{17}H_{21}NO_4.HCl + NaHCO_3 \rightleftharpoons NaCl + C_{17}H_{21}NO_4 + CO_2 + H_2O.$$

Removal of the base, *e.g.*, with Chloroform (or by *absorption, in vivo*) favours the decomposition of the Hydrochloride. We believe the enhanced activity of such a solution is due to the fact that it contains ***Cocaine Base.***

We next determined the ***solubilities of certain alkaloidal bases*** in various solutions to find, if possible, a better solvent than water which could be injected into the tissues. Sodium Chloride, 1% strength, is approximately 'Normal' Saline, and 5% Glucose is also isotonic with the blood. The following table provides the data found.

SOLUBILITIES OF ALKALOIDAL BASES IN VARIOUS SOLVENTS.

Suitable for injection into the tissues.

Alkaloid.	Water.	1% Sodium Chloride ('No. 1 Solvent).	5% Glucose ('No. 2 Solvent).	1% Sodium Bicarbonate ('No. 3 Solvent).
Atropine	1 in 560	1 in 700	1 in 600	1 in 130
Cinchonidine ..	1 in 4000	1 in 5550	1 in 3500	1 in 4500
Cocaine	1 in 1300	1 in 1800	1 in 1600	1 in 1000
Codeine	1 in 130	1 in 145	1 in 130	1 in 110
Diacetyl-Morphine (Heroin)	1 in 800	1 in 900	1 in 1000	1 in 1300
Emetine	1 in 600	1 in 560	1 in 450	1 in 300
Morphine	1 in 5000	Approximately the same as in water		
Quinidine	1 in 2200	1 in 2000	1 in 1540	1 in 2500
Quinine	1 in 2600	1 in 3000	1 in 1750	1 in 2000
Strychnine	1 in 2800	1 in 2800	1 in 4500	1 in 7100

The above figures (actually obtained by our experiments, 1923—1924) can be regarded as approximate only, since such slight solubilities are greatly influenced by physical conditions. It will be found that our figures in some cases differ from those given in the past in chemical literature. We took special care to purify the base in the case of Strychnine for determining the solubilities, as divergence was observed in this instance. The B.P. solubility for Codeine in water is incorrect.

Some of the following have been submitted to clinical trial :—

* '**Steriloids**' (T.M. 260647). Prepared with 2 Cc. (except where stated) of *No.* 1 *solvent* (1% Sodium Chloride) of Atropine 1/400, 1/200 and 1/100 grain in 1 Cc. ; Cocaine 1/60 grain ; Codeine 1/16 grain and ¼ grain ; Diamorphine 1/50 grain, 1/30 grain (in 2·5 Cc.) ; Emetine 1/18 grain ; Morphine 1/160 grain ; Quinidine 1/60 grain , Strychnine 1/360 grain in ½ Cc., 1/180 grain in 1 Cc., 1/90 grain.

* '**Steriloids**,' containing 2 Cc. of solution in *No.* 2 *solvent* (5% Glucose) have been made of Cocaine 1/50 grain ; Emetine 1/14 grain ; Quinidine 1/50 grain ; Quinine 1/60 grain.

In like manner '**Steriloids**,' using *No.* 3 *solvent* (1% Sodium Bicarbonate), containing 2 Cc. of the solution, have been made of Cocaine 1/30 grain ; Codeine 2/7 grain ; Emetine 1/9 grain ; Morphine 1/160 grain ; but in general we should not favour this solvent, owing to possible detrimental action on the alkaloid.

It will be noticed that, generally speaking, we selected the solvent giving the best solubility figure for the respective alkaloids.

Other alkaloids can be similarly treated. The solutions are prepared with aid of mechanical agitation and extreme care taken to ensure that they are bacteriologically sterile. Such solutions cannot be subjected to heat.

It appears to us that solvents of this kind would be preferable to the use of caustic alkali suggested in the 'activated' preparations. The latter could not be relied upon for permanence—indeed, there is the danger of producing decomposition products of the alkaloids in storage.

Therapeutically, the preparations should be safe, providing the solutions are carefully stored and possible decomposition guarded against.

Our theory is, that on injection into the tissues, ***an alkaloidal salt becomes dissociated by the alkalinity of the blood—the base is liberated and this then dissolves in the plasma, solution probably being favoured by the labile condition of the alkali in the blood.***
If this is correct, one may as well administer the alkaloid in the basic condition in a solvent, *e.g.*, Normal Saline, Glucose or Sodium Bicarbonate, such as we have experimented upon.

EXPERIMENTAL.

Experiments to determine whether, in contact with blood, free alkaloidal bases are liberated from alkaloidal salt solutions.

First Experiment.

Saturated solutions were prepared containing 1 grain of the hydrochlorides of Cocaine and Quinine and ½ grain of Strychnine Hydrochloride. These were mixed with a few Cc. of blood and after some time were extracted with Ether to remove any liberated alkaloid. The Ether was washed with a little water, the alkaloid was extracted with acid and precipitated into Ether. An acid extraction of the Ether was tested and the alkaloids identified in it.

It was found that the Cocaine Hydrochloride and blood mixture contained the most free base, while apparently considerably more Quinine than Strychnine was liberated.

SECOND EXPERIMENT.

The Hydrogen ion concentration value of the blood is stated to vary between pH7 and pH8. A solution of Sodium Phosphates was prepared which had pH=8 (these alkalinities one meets in health and ill-health) and solutions of small quantities of the hydrochlorides of Strychnine, Cocaine and Quinine were made in it. On extracting with Chloroform, it was found in every case that some free alkaloidal base was present.

Uses.—The utility of these alkaloidal base preparations is that prompt effect is produced without calling upon the tissues to break down the medicament injected. A large dose—or indeed an average dose—of an alkaloidal salt is virtually a foreign body. We agree the effect may be correspondingly transient, because of course the amounts are in some cases minute, but the injection can be repeated if desired. There is economy in the chemical and the possibility of overdose is reduced to a minimum. The possibility of deranging the stomach with these small doses is also reduced. The injection of a *minute* amount of the alkaloidal base, producing a prompt effect of the calibre of a much larger amount of the corresponding alkaloidal *salt* may be of considerable value in 'withdrawal' treatment in the case of drug addicts. The preparations have the added advantage for the medical man that they are outside the provisions of the Dangerous Drugs Acts.

Intravenously, these new preparations offer some possibilities. As yet, trials have not been conducted by this route.

Clinical Trials in a small number of surgical cases have been made with some of these solutions (1924). In particular, the **Atropine Base** in No. 1 Solution was used to check secretion before gas and prior to ether anæsthesia. Doses of 1/400 grain were, as a rule, satisfactory except for very robust patients. It was found necessary to operate within $\frac{3}{4}$ hour. On the whole, a careful comparison showed that 1/400 grain of Atropine in this basic form is roughly equivalent to 1/100 grain of Atropine Sulphate, given at about the same interval before operation.

The effect with Atropine base passes off more rapidly.

Morphine Base 1/160 grain in No. 1 Solution has been tried after operations where pain follows, both of slight and medium severity. It is remarkable that this small quantity of morphine had some effect: as a rule, sufficient to ensure satisfactory sleep and comfort in women. When used for big men, the patients were restless in coming round from the anæsthetic, but did not, as a rule, complain of pain.

Morphine Base 1/160 grain in half-strength Chloroform Water was also tried with somewhat similar effect.

Codeine, $\frac{1}{4}$ grain, both in the form of base and a customary salt were inadequate in relieving pain in one case.

Comparatively, the usual routine was to give $\frac{1}{4}$ grain of Morphine Tartrate after operation.

A further report from another authority was awaited at time of going to press.

The other alkaloids have as yet not been reported on, but information concerning Cocaine, Diamorphine, Emetine, Quinidine and Strychnine would certainly prove of interest.

ALKALOIDAL PERIODIDES.

The author has prepared numerous Alkaloidal Periodides, in addition to Emetine Periodide, which is fully described in the chapter on Ipecacuanha. A paper dealing with the last mentioned was read by the author in conjunction with J. Graham Willmore at the Royal Society of Tropical Medicine and Hygiene, London, in May, 1923. These compounds have been little used in medicine, and there would seem to be a field of usefulness for them in the light of results obtained with the Emetine compound. Even the literature on the chemistry of the Periodides is exceedingly meagre. (Recent ref.: Jl. Pharm. et Chim. '09, 193.) The following are now described :—

	Dose.	*Ref.*
Cinchonidine Periodide	.. 1½ to 3 grains	.. page 708
Cocaine ,,	.. 1/40 ,, 1/20 ,,	.. ,, 346
Codeine ,,	.. ¼ ,, ½ ,,	.. ,, 361
Emetine ,,	.. 2 ,,	.. ,, 522
Morphine ,,	.. 1/16 to ⅛ ,,	.. ,, 556
Papaverine ,,	.. ½ ,,	.. ,, 560
Quinidine ,,	.. 1½ to 3 ,,	.. ,, 707
Quinine ,,	.. 1½ ,, 3 ,,	.. ,, 718
Sparteine ,,	.. ½ ,, 3 ,,	.. ,, 758
Strychnine ,,	.. 1/100 ,,	.. ,, 767

Constitution of the Alkaloidal Periodides.

The following investigation was carried out to prove that periodides have the composition : Base I*n* and not Base HI.I*n*.

(It is well-known that **Periodides** in which the Iodine is combined with the Hydriodides of the bases exist, but we are not now concerned with this type.

Quinidine Periodide was used for the following reasons :—

Nearly all the periodides are obtained as precipitates on mixing solutions of Iodine and base, so that there is the possibility of the formation of a mixture of compounds containing different amounts of Iodine (Quinine forms $B.I_2$, $B.I_3$, $B.I_8$, etc.). Quinidine Periodide, however, is more likely to be a uniform substance, since it crystallises on cooling an Alcoholic solution of Anhydrous Quinidine and Iodine. Again, Quinidine Periodide is much more readily decomposed than most of the periodides, and being relatively simple—two molecules of Iodine to one of base—it can only have the formula $B.I_2$ or B.HI.I.

Theoretical Considerations.

The method depends upon an examination of the products of the reaction when the ' Periodide Iodine ' is removed from an alkaloidal periodide by means of Sodium Thiosulphate under suitable conditions. A compound of the type Base HI.I*n*. would be reduced to the hydriodide of the alkaloid, whereas periodides like Base. I*n*. should yield the alkaloid with removal of all the Iodine by Thiosulphate. The results given below show that the latter is actually the case for Quinidine Periodide, and this proves the existence of a class of compounds like Alkaloid. I*n*. Unfortunately, this method cannot be applied to each individual periodide, since some

are much more stable than Quinidine and resist the action of acid, alkali and reducing agent. With Emetine Periodide only a part of the Iodine is removed by Sodium Thiosulphate with the formation of, apparently, a complex lower periodide. Even in this case, however, a small amount of alkaloid and not hydriodide is liberated.

Experimental Details.

0·5 Gm. of the periodide was dissolved in Chloroform (about 50 Cc.) and N/10 Sodium Thiosulphate Solution was added gradually, with considerable shaking, until the Chloroform solution became colourless. This gave an estimation of the 'Periodide Iodine.'

The 'Periodide Iodine' (then present as Sodium Iodide), together with any hydriodic acid, was estimated in the aqueous layer by means of Silver. An appreciable difference between these two estimations would indicate the presence of Quinidine Hydriodide.

The Chloroform containing the alkaloid was evaporated to dryness and the residue weighed. That this residue consisted of base was proved by an approximate titration, using Methyl Red as indicator.

Finally, the total Iodine in the compound was estimated by an ignition method.

Quinidine Periodide, No. 1 was prepared by crystallisation from an Alcoholic solution of Iodine and Anhydrous Quinidine.

Quinidine Periodide, No. 2 was prepared by evaporating slightly a solution of Anhydrous Quinidine in Ether with Iodine in Benzol.

	Quinidine Periodide No. 1 (from Alcohol).	Quinidine Periodide No. 2 (from Ether-Benzol)
Theoretical % Iodine for Base I_2 .	43·9	43·9
% Iodine found by ignition method	45·2	43·9
% 'Periodide Iodine' estimated by $Na_2S_2O_3$	44·4	42·7
% Total Iodine in aqueous layer, estimated by Silver	—	42·9
% Anhydrous Quinidine estimated by weighing	50·7	57·0
% Anhydrous Quinidine estimated by titration of residue ..	47·0	55·1

It is seen from the above figures that all the Iodine is present as 'Periodide Iodine,' and that its removal liberates not Quinidine Hydriodide but base. This proves conclusively that Quinidine Periodide has the formula $C_{20}H_{24}N_2O_2.I_2$, and by analogy, since the methods of preparation are similar, all the other periodides we have made should have formulæ of the type Base, *In*.

Further evidence in support of this conclusion is given by the behaviour of Caffeine. Several different solvents were used, but in no case could a crystalline periodide be prepared by the direct union of Iodine and Caffeine. For example, a Chloroform solution of the

constituents gave on evaporation only Caffeine contaminated with a little Iodine. (Similar results were obtained with Theobromine). On the other hand, a crystalline hydriodide periodide Base.HI.I_2 is readily prepared by the union of Caffeine, Hydriodic Acid, and Iodine. This suggests at once that there are two distinct classes of compounds—those containing hydriodic acid and those prepared by combination of alkaloid and Iodine only.

Chemically, it is of interest that the true periodides with which we are concerned, vary in their *capability of withstanding* treatment with Physiological Acid and per contra of *liberating the alkaloidal base* in presence of Physiological Alkali.

Behaviour of certain Alkaloidal Periodides towards acid and alkali of physiological strength.

The following figures which are results of our investigations are of interest. The variation is doubtless referable to the molecular arrangement of the Iodine atoms with the alkaloidal molecule.

Alkaloidal Constituent of the Periodide.	*Probable Formula.*	*Theoretical % Alkaloid for ascribed Formula.*	*% Anhydrous Alkaloid found (by estimation of Iodine.)*	*Anhydrous Alkaloid liberated as % of the Periodide, by*	
				Physiological Acid.	*Subsequent treatment with Physiological Alkali.*
Cinchonidine	B·I_4	36·7	37·7	1·9	2·0
Cocaine ..	B·I_3	44·3	47·9	1·5	15·7
Codeine ..	B·I_2	54·1	58·4	38·5	11·6
Emetine ..	B·I_6	38·7	37·8	0·4	2·1
Morphine ..	B·I_2	52·9	54·0	17·1	9·1
Papaverine .	B·I_2	57·2	56·2	0·7	2·3
Quinidine ..	B·I_2	56·1	56·1	39·0	12·7
Quinine ..	B·I_3	46·0	48·2	1·6	9·3
Sparteine ..	B·I_3	38·0	36·5	12·4	3·0
Strychnine .	B·I_2	56·8	56·8	13·6	10·0

Experimental Details.

In making these determinations, 1 Gm. of the periodide was repeatedly shaken with 200 Cc. of 0·2% of Hydrochloric Acid during 4 hours at 40° C. The insoluble residue was then again shaken during 4 hours at 40° C. with 200Cc. of Physiological Alkali.

The Physiological Alkali was a solution containing 1·34% of Sodium Bicarbonate and 1·14% of Sodium Carbonate ($+10H_2O$), as this has a Hydrogen Ion concentration similar to that of the intestinal fluid. (pH=9·5).

Pharmacology and Uses.—The author is indebted to a number of his assistants for volunteering to take these various periodides and to determine in consequence, suitable therapeutic doses. For further details see each individual Periodide.

Alkaloidal Mercuric Iodides.—Preparation in crystalline condition. Those of Caffeine, Theobromine, Cocaine, Sparteine, Quinine, Morphine, Codeine, Pilocarpine and Strychnine, contain no Chlorine and no water of crystallisation.—P.J. il./22,294.

ALOE.

Aloe (*Off.*) is from *A. chinensis* (*Liliaceæ*), and *A. Perryi* and other species, known commercially as Curacao, Socotrine or Zanzibar Aloes. 'Aloe' Fr. Cx. and P. Jap, is from 'various species.'

P. Ital. IV. mentions A. *Socotrina*, *A. ferox* and A. *spicata*. P. Helv. specifies *A. ferox*.

Dose.—2 to 5 grains (**0·12 to 0·3 Gm.**).

For analytical data on Aloes see Vol. II.

Uses.—Aloes and Aloin act chiefly on the lower bowel. They are employed with soap and with iron and with strychnine in the treatment of habitual constipation.

The **Natal** or **Cape** varieties of Aloes (from *A. ferox*) are not official—they are of vitreous fracture, and characteristic odour, and mostly used for veterinary purposes. Have been found to contain as much as 6% Barbaloin.

Extractum Aloes (*Off.*).

Dose.—1 to 4 grains (**0·06 to 0·25 Gm.**).

Barbados Aloes yield 60 to 70% of Extract, *cf. Vol. II.*

Extractum Aloes Socotrinæ. B.P. 1885. Yield about 45%, *cf. Vol. II.* *Dose.*—2 to 4 grains (**0·12 to 0·25 Gm.**).

Pilula Aloes et Ferri (*Off.*).

Dose.—4 to 8 grains (**0·25 to 0·5 Gm.**).

Exsiccated Ferrous Sulphate 1, Aloes 2, Compound Cinnamon Powder 35, Glucose Syrup 3 or *q.s.*

Tablets are also prepared 4 grains each. An excellent remedy for habitual constipation.—W. W. W.

Pilula Triplex. *Dose.*—1 to 3 pills.

Aloes Extract 2 grains, Podophyllin $\frac{1}{4}$ grain, Mercurial Pill 1 grain, Cathartic with particular action on the liver.

℗Pilula Aloes, Cascara et Hyoscyami.

Dose.—4 to 8 grains (**0·25 to 0·5 Gm.**).

Extract of Aloes, Extract of Cascara, Extract of Hyoscyamus, equal parts.

℞ **Pilula Aloes, Nucis Vomicæ et Belladonnæ.**
Extract of Aloes 1, Extract of Nux Vomica ½, Extract of Belladonna ¼. In grains for one pill.

Tinctura Aloes (B.P. '98).
Dose.—1½ to 2 drachms (**6 to 8 Cc.**), or ½ to 1 drachm (**1·2 to 4 Cc.**) repeated. Extract of Barbados Aloes 1 in 40.
Pruritus vulvæ,—tampons saturated with Aloes Tincture give relief.

Glycerinum Aloes.
Evaporate Aloes Tincture 6 to 3, gradually adding Glycerin 30. Pigment for bed sores and anal fissures.

Dewees' Emmenagogue Mixture (H.).
Dose.—½ ounce thrice daily.
Tincture of Aloes 8, Tincture of Ferric Chloride 6, Tincture of Cantharides 2, Ammoniated Tincture of Guaiacum 3, Syrup to 90. Largely employed in the U.S. in functional and organic amenorrhœa.

Aperitive Elixir. *Dose.*—½ to 1 drachm (**2 to 4 Cc.**)
Tincture of Aloes 2, Tincture of Myrrh 2, Tincture of Saffron 1.

Tinctura Aloes Composita, P. AUSTR.
Average dose.—1 to 2 drachms (**4 to 8 Cc.**).
Cape Aloes 15, Gentian Root 2½, Rhubarb 2½, Zedoary Root 2½, Saffron 2½, Alcohol (70%) 500.

For threadworms Aloes with carminative in the morning early. After evacuation an enema of 3 tablespoonfuls of salt—repeated during 10 days or so. Avoid salads and watercress.

Pulvis Aloes cum Canella, P. DAN, 1836. *Hiera Picra.*
Dose.—3 to 10 grains (**0·2 to 0·6 Gm.**).
Hepatic Aloes 16, White Canella Bark 3. Much used as a domestic emmenagogue.

For insect bites a saturated solution of Aloes in Tincture of Tolu. —F. W. Cock, B.M.J. ii./18,256.

Aloin, $C_{16}H_{16}O_7$, $3H_2O$=374·256.
Official dose.—½ to 2 grains (**0·03 to 0·12 Gm.**). ¼ grain may be considered an aperient, and 1 grain a full purgative dose. The former is U.S. *Average dose.* In a pill with hard soap. Assuming Extract of Aloes to contain on an average 25% of Aloin, it follows that ¼ grain of the latter is equivalent in activity to 1 grain of Extract.
As *Hypodermic Purgative* has been tried,—½ grain in water 30 minims (sufficiently warm to dissolve), but it is not always satisfactory.

A principle obtained officially from Barbados or Socotrine Aloes in odourless yellow crystals, having the characteristic taste of aloes; *soluble* in cold water, 1 in 140 (Barbaloin), in alcohol 90%, 1 in 20, almost insoluble in Ether. Aloes contains as much as 30% of Aloin. Aloin Chemistry.—Naylor, P.J. ii./06,73.
Oxidation of Aloin and of other constituents of aloes with alkali persulphate also by Caro's Acid and Sodium Peroxide.—E. Seel, J.C.S.A. i.,20,67 *et seq.*
Aloes, Cascara, Rhubarb, and other Emodin containing drugs—process of separation and identification employed in U.S.A. for examining nostrums.—W. S. Hubbard, Jl. Ind. Eng. Chem. IX., p. 518. P.J. i./17,469.

℗ **Pilula Aloin Composita.**—For constipation, Sir A. Clark recommended Aloin, extract of nux vomica, sulphate of iron, myrrh and soap, of each ½ grain in a pill taken ½ hour before last meal of the day. If fæces be hard and there be no special heart weakness add ½ grain of ipecacuanha, and should griping be caused add also ½ grain of extract of belladonna.

℗ **Tablets, Anti-Constipation.**—The above without Ipecacuanha.

℗ **Pilula Aloin, Strychninæ et Belladonnæ.**

Dose.—1 or 2. Aloin $\frac{1}{5}$, Strychnine $\frac{1}{60}$, Alcoholic Extract of Belladonna $\frac{1}{8}$, in each ; in fractions of a grain, make one pill ; of a gramme, fifteen pills.

℗ **Tablets of Aloin Compound** represent the latter with Ipecacuanha $\frac{1}{16}$ gr. **Tablets of Aloin** (Plain), $\frac{1}{10}$ and ½ grain.

℗ **Pilulæ Laxativæ Compositæ, U.S. VIII.** 100 pills contain Aloin 1·3, Strychnine 0·05, Extract of Belladonna Leaves 0·8, Ipecacuanha 0·4, Glycyrrhiza 4·6 Gm., Syrup, *q.s.*

Suppositoria.—Fr. Cx. Aloes 0·5 Gm., Cacao Butter 2·5 Gm.

℗ **Marienbad Tablets.** Published formula:—Aloes Extract 1·25, Rhubarb 1·25, Podophyllin 0·25, Cascara Extract 0·50, Belladonna Extract 0·12. Divided into 50 tablets, keratined and silvered.—Pres., Mar., 1907.

ALUMINIUM.

Al=27·0.

Alumen Purificatum (*Off.*) is Aluminium and Potassium Sulphate (Potash Alum) $Al_2(SO_4)_3$ K_2SO_4, $24H_2O$=948·824, *or* the Ammonium Salt $Al_2(SO_4)_3(NH_4)_2SO_4$, $24H_2O$ = 906·648.

Dose.—5 to 10 grains (**0·3 to 0·6 Gm.**).

Soluble 1 in 10 of water.

Uses.—As an astringent for local application. Ulcers on the lips are cured by its use. As a mouth-wash its solution is possibly not desirable unless it be quickly removed by rinsing. Destruction of the teeth may occur.

Injectio Aluminis L.H. for vaginal use. 60 grains in 1 pint.

Whooping cough has been treated with 1 to 2 drachm doses of 2% Alum Solution alternate hours—also combined with adequate doses of Chloral Hydrate.—B.M.J.E. i./20,13 ; Pres. Feb./21, p. 110.

Poisoning by Aluminium produces a rather slow intoxication. In a case contracted by a metal worker there was loss of memory, tremor, jerking movements and impaired co-ordination, also chronic constipation and incontinence of urine.—J. Spofforth, L. i./21,1301.

Alumen Exsiccatum (*Off.*). *Syn.* Alum Ustum, Burnt Alum, is made by heating Potash Alum until it has lost 45 to 46% of its weight. It may also (U.S.) be made from Ammonium Alum.

Glycerinum Aluminis *Off.*). 1 in 6, *v.* p. 441.

Ophthalmic Lamels contain $\frac{1}{250}$ grain of alum in each.

Points of Alum, also of **Copper Sulphate,** mounted in wooden cases, are prepared for ophthalmic and other uses.

Aqua Hæmostatica, P. Ital. IV. ACQUA DEL PAGLIARI.

Alum (Potash) 80, Benzoin Tincture 10, Benzoic Acid 2, Water to 1,000. Filtered after allowing to deposit. If with 10% Sodium Chloride it is POLLACCI'S modification.

Alumini Sulphas, *Syn.* ALUMINIUM TRISULPHATE. $Al_2(SO_4)_3 + 16H_2O = 630{\cdot}436$.

White crystalline powder or lumps made by dissolving freshly precipitated Aluminium Hydroxide in Sulphuric Acid. ***Soluble*** 1 in 1 of water nearly. Loses about 45·7% water of crystallisation on heating to 200° C.

Incompatible : alkalis and alkaline carbonates.

Liquor Aluminii Acetici, P.G.V., P. AUSTR. P. JAP. IV. *Syn.* BUROW'S SOLUTION, **Solutum Aluminii Acetici,** P. BELG.

Dissolve Aluminium Sulphate 100 in Water 270 without heat. Filter and add Water to Sp. Gr. 1·152, and while constantly stirring pour in by degrees Precipitated Calcium Carbonate 46, mixed with Water 60, and finally Dilute Acetic Acid (30%) 120 in portions. Set aside in an open dish until gas evolution ceases, stirring frequently, then decant, press the sediment (without washing), filter the solution and dilute to Sp. Gr. 1·044 to 1·048. Contains 7·3 to 8·3% of Basic Aluminium Acetate $Al(C_2H_3O_2)_2OH = 162{\cdot}076$.

Diluted with twice as much water, thus making a 2½% solution, it has been used as an antiseptic lotion, and gauze impregnated with a 5% solution has been used as a dressing.

1 to 3 of orange flower water forms a pleasant mouth lotion.

C.L.T.E. has **Guttæ** of this liquor diluted 4 times—for use in acute otitis externa and media.

The P.G. Liquor diluted 1 drachm to the ounce forms an approximate 1% solution. It is largely used on the Continent in clinics in place of the Boric Lotion used here. It is non-toxic, non-irritant and markedly astringent. For moist fomentations and as the medicament for a bath in which to place hand or foot for continuous irrigation. In dermatitis whatever be its cause, in suppurating open wounds and in cutaneous erysipelas there is nothing to equal fomentation with it. An objection is, however, that after three weeks' continuous irrigation tissues become very hard. Twenty-four hours immersion in warm normal saline (one drachm to the pint) largely removes the indurated state.—H. F. Waterhouse, B.M.J. ii./10,62. Personally, we believe Boric Acid Lotion is better.

Aluminii Acetas. $Al_2(OH)_2(C_2H_3O_2)_4$ (?) = 324·152.

White powder slightly *soluble* in water.

Is used as a desiccant and deodorant in powder or with glycerin.

Note.—**Neutral Aluminium Acetate.** $Al_2(CH_3COO)_6 = 408{\cdot}404$ is only known in Solution. If such a Solution be evaporated below 38° C. the basic salt of formula probably $Al_2(OH)_2(CH_3COO)_4$ soluble in water is obtainable as in the Liquor above. If on the other hand the Solution be boiled the basic salt, probably of formula $Al_2(OH)_4(CH_3COO)_2$ is thrown out, *i.e.*, it is insoluble in water.

For ophthalmia neonatorum 10% Ointment has been used applied between the lids every hour in place of Silver Nitrate drops.

Œdematous swelling : antiphlogistic treatment with cooling applications, boric acid and acetate of aluminium.—B.M.J.E. i./10,36.

As an *anthelmintic* Aluminium Subacetate has been used in treatment of oxyuriasis. Dose for an adult 1 Gm. 3 times daily

for three days ; for children 0·5 Gm., and for infants 0·5 Gm. twice daily—preceded in each case by a dose of Calomel.—W. T. Schmidt, per Jl. Trop. Med., May 1/23,146.

Aluminii Aceto-Tartras, PH. NED.—*Syn.* ALSOL.

Made by dissolving Aluminium Hydroxide freshly precipitated in Acetic and Tartaric Acids. We use 312, 360 and 450 parts respectively.

In shining masses, ***Soluble*** in water. An astringent and antiseptic employed in 1 or 2% solution as mouth wash and gargle. Also for wound treatment the same strength.

Solubility.—We find that a solution as strong as 50% in water can be made. Powder finely, and allow to macerate a few hours with shaking, The salt is more rapidly soluble in Ammonium Chloride and in Ammonium Acetate Solutions.

Liquor Aluminii - Aceto - Tartratis, *Syn.* **Aluminium Aceto-Tartaricum Solutum, P. Helv.**

Dissolve Aluminium Sulphate 30 in warm water 100, cool and add Acetic Acid (30%) 36, then, with stirring, Calcium Carbonate 13 in water 35, allow to stand 24 hours with occasional shaking, filter off the solution and add to every 100 of filtrate Tartaric Acid $3\frac{1}{2}$.

Specific Gravity 1·055 to 1·059. Contains about 10% Aluminium Aceto-Tartrate. According to P. Helv. this is to be supplied when Liquor Aluminii Acetatis is ordered. This formula contains Aluminium Sulphate and an excess of Acid.

Stomatitis may be treated by frequent rinsing of the mouth with this Solution and Salol as a paste to the parts.

Liquor Aluminii Formatis.—We find this may be prepared by precipitating the Hydroxide from 630 of Aluminium Sulphate crystals, and dissolving in 1152 of 25% Formic Acid. Thus made it contains the equivalent approximately of $\frac{1}{3}$ of its weight Aluminium Formate taken as $Al_2(H.COO)_6$ Other formulæ have been given for Aluminium Formate. Employed like the foregoing as a gargle diluted 1 to 3% with water, useful.

Aluminii Chloridum, $Al_2Cl_6,12H_2O=482·952$.

Dose.—2 to 4 grains (**0·12 to 0·25 Gm.**).

A white, amorphous deliquescent powder. Has been found of distinct service in locomotor ataxy ; relieves the lightning pains. May be combined with other drugs.

Liquor Aluminii Chloridi. Dissolve Aluminium Chloride $+12H_2O$) 20, in water to produce 34 by volume=42·5% by weight.

Pilula Aluminii Chloridi.—*Martindale.*—2 grains in each.

Dose.—1 to 2 thrice daily. These are convenient for treatment, being portable.

Aluminii Chloras, $Al(ClO_3)_3=277·38$.

Deliquescent crystals containing either 6 or 9 H_2O.

A 25% solution may be prescribed. This further diluted 1 to 25 forms a 1% mouth wash or spray in throat affections, and as a prophylactic against infection.

A 20% solution of the Chlorate in Water or Glycerin has been used on tampons for leucorrhœa or cervical catarrh.

Alumini Hydroxidum, U.S.

Prepared by pouring hot potash alum solution into a hot solution of Sodium Carbonate.

***Alocol** (T.M. 406220) **Tablets.** COLLOIDAL ALUMINIUM HYDROXIDE TABLETS. *Dose.*—Two to be dissolved in the mouth half an hour before and after each meal.

For treatment of flatulence, hyperacidity, pyrosis and allied gastric disturbances.

***Alumnole** (T.M. 215948) is aluminium naphthol-sulphonate.

Manufacture.—By interaction between Barium Betanaphthol Sulphonate and Aluminium Sulphate Solutions. The Barium compound is made by warming Betanaphthol 10 in Sulphuric Acid 8 on a water bath until a sample dissolves clear in water, then diluting and saturating with Barium Carbonate, filtering and evaporating to dryness (Patent 10 668 expired 1902).

Lotion, gargle and ointment ¼ to 2% in pharyngitis, rhinitis, ozœna, and gonorrhœa.

Soldering Aluminium.—A large number of solders and appropriate fluxes are given C.D. ii./07,631, to which reference should be made by those seeking information.

Thermit is a mixture of powered Aluminium and magnetic Iron Oxide used in welding Iron and Steel and in repairing broken steel castings

Duralumin. — An alloy of Aluminium slightly heavier than the pure element.—Its strength is about the same as mild steel Practically non-corrodible. Recommended for surgical appliances, splints, etc.—B.M.J. 1./12,236.

Aluminium Vessels.—Experiments with Aluminium laboratory and kitchen utensils. These stood tests well—no suspicion of conveying poisonous metals Aluminium is not appreciably acted on in cooking. It is, of course a good conductor of heat Aluminium vessels when not in use should be kept perfectly dry. Water, for example, should not be left in soldiers' water bottles. It is stated that the Aluminium used contains only 2% of impurities. —L. i./13,54.

Pulvis pro Pedibus, P. Helv.

Potash Alum 15, Talc 85, in fine powder. For tender feet. Another useful form of **Foot Powder** is: Talc 2, Boric Acid 2, Orris 1, Zinc Oleate Powder 1.

Kaolin (*Off.*) **Bolus Alba, P.G.V.,** PH. ITAL. IV., **P. Jap.**

Native white aluminium silicate, $H_2Al_2Si_2O_8+H_2O=258{\cdot}832$ purified by elutriation from sandy matter; it is a smooth white powder. A useful absorbent powder for irritation of the skin. It is unacted upon by most chemicals, hence used for making pills of Silver Nitrate, Gold Chloride, and Potassium Permanganate (*see* Unguentum Kaolini). It is useful for sprinkling on to the filter paper in clarifying liquids. It should leave not less than 85% non-volatile residue on ignition nor contain marked impurity of iron.

Internal Use:

Dose.—¼ to 1 ounce (8 to 30 Gm.). Spoonfuls' are mentioned with water, milk or emulsified with gum. Best on empty stomach.

Both Talc and Kaolin have been given as substitute for Bismuth in gastric and intestinal affections. Talc is insoluble and not affected by acids. In diarrhœa of phthisis upwards of 200 Gm. *p.d.* Does not constipate like bismuth.

Asiatic cholera treated by Kaolin with Hypertonic Saline. Might also be useful in typhoid.—B.M.J. i./21,640.

Asiatic Cholera well treated by Kaolin 100 Gm., water to 250 Cc. ½ pint doses were given ½ hourly for the first 12 hours, the second 12 hours several glasses were taken. Vomiting ceased and patients improved. Rectal injections of the same suspension also given. Acts mechanically. Also good in

diphtheria, ptomaine poisoning, bacillary diarrhœa.—R. R. Walker, Proc. R. Soc. Med. Oct. 21; L. ii./21,273, 300.

Osmo Kaolin. *Syn.* COLLOIDAL KAOLIN. *Dose*:—A teaspoonful or more in water, two or three times a day, gradually increased, if required. If necessary, a little aperient is given at the same time. The preparation is a very efficient absorbent of bacteria and toxins. Has also been tried in cases of rheumatism and gout.

Colloidal Kaolin used with advantage in chronic intestinal conditions. Uses similar to the above and for healing ulcerated mucous membrane. A prescription is:—**Collasan** 3½ ounces (a variety in commerce), Tragacanth Mucilage 1 ounce, Peppermint Oil 10 minims, water 8½ ounces—a wineglassful every 6 hours.—A. C. Jordan, L. i./23,432.

Colloidal Kaolin should contain no organic or inorganic toxic matters and should yield no bacterial growth either aerobically or anaerobically.—A. White-Robertson, P.J. ii./22,396.

Sil-Al.—*Dose*, 1 drachm (**4 Gm.**) increased, in water half an hour before meals, is for the same purposes as the above.

Vaginal insufflation of the powder with subsequent douching to check discharge has been tried. The dry method is claimed to have a prophylactic value—by absorbing irritant discharge the production of fresh erosion is prevented, and those existing have an opportunity of healing.

Operative Skin Preparation and Treatment.

All clean wounds heal better if kept dry. Moisture undoubtedly favours or provokes inflammation,—water is, of course, a *sine qua non* for the life of vital organisms. The day of moist dressings is over. It is best to clean the skin with Ether Soap, then go over with Turpentine, then with Biniodide in Spirit, finally cover with Sterile Kaolin and bandage with a dry sterile compress, but no protective Oil Silk, Gutta Percha Tissue, etc., to keep moisture in.—L. i./13 1052.

Cimolite is a special preparation, agreeably perfumed.

Fuller's Earth (China Clay) is a similar silicate, containing traces of Iron and Magnesia.

Terra Alba in commerce is variously Kaolin, Gypsum, Burnt Alum or Magnesia, in preference the first.—W. H. M.

Westcott has drawn attention to the frequent deaths of infants by tetanus when Fullers Earth has been applied to sores on navel and nates—there may be serious risk of infection of more than one kind from the use of this unsterilised earth. Warning should be given to the poor not to use this. Boric Acid with Zinc Oxide and Starch is safe in use.—B.M.J. i./08,892.

Unguentum Kaolini.

Soft Paraffin 1, Hard Paraffin 1; melt, add Kaolin 1, and stir till cold. Spread on rag to apply on abraded skin, it allays irritation. Also as pill excipient, *v. ante.*

Asbestos in intimate contact, *e.g.*, with Solutions, has an action on various substances. Diastase, *e.g.*, is removed from liquids containing this ferment in 24 hours,—the Asbestos itself becoming active. Starch Paste (0·5% in water) in presence of Asbestos, after 3 months, shows no trace of Starch in Solution,—it is converted into Sugar. The Asbestos also gives no Starch reaction. It reduces the radio-activity of radio-active waters and of Thorium Nitrate Solution. Gelatin loses its power of setting again. It also removes Alkaloids, Proteins and Hormones (*e.g.*, Adrenalin) from Solutions.—B.M.J. ii./13,1362,1376.

Extraction of Morphine and other alkaloids by means of an insoluble Silicate of Metal of the Aluminium group, *e.g.*, Fullers Earth. Subject of patent.—P.J. i./14,32.

Talc. A native foliaceous magnesium silicate; that from the Tyrol—Venetian Talc—is soft and unctuous.

Talcum Purificatum, U.S., is the above purified (by hydrochloric acid).

French Chalk is a harder silicate of magnesium.

Kieselguhr, a diatomaceous or infusorial earth, known as white peat, burnt produces a light absorbent powder. It is used in making tooth pastes. **Ceyssatite** is a calcined siliceous earth from Ceyssa (Auvergne).

Portland Cement is prepared by incinerating a mixture of Limestone and Clay. Consists mainly of Calcium and Aluminium Silicates. Possesses the property of solidifying to a stone on moistening with water—presumably owing to formation of Hydrous Calcium—Aluminium Silicates and Calcium Aluminates. A large proportion of the lime is, however, present in the cement when "set" as Calcium Hydroxide. Might be used for its scouring effect on wounds.—L. ii./17,368.

AMMONIUM.

$NH_4 = 18{\cdot}04$.

Ammonii Bromidum (*Off.*). $NH_4Br. = 97{\cdot}96$.

Dose.—5 to 30 grains (**0·3 to 2 Gm.**).

Small colourless crystals ***Soluble*** in water 2 in 3, less in alcohol (1 in 15). ***Incompatible*** with mineral acids and silver nitrate.

Limit of Lead content as impurity—10 parts per million.

Flavoring.—Glyl Vanillæ, Glyl Rosæ (excellent); Syrupus Zingiberis, Extractum Glycyrrhizæ Liquidum.

Uses.—Possesses similar sedative properties to those of the other bromides, and is thought to cause less depression.

In sea sickness Ammonium Bromide, beginning a day or so before the voyage, in doses of 20 grains in Chloroform Water with 15 grains of Sodium Bicarbonate thrice a day found useful.—Yeo.

In tinnitus a course of ammonium bromide with Syrup of Glycerophosphates does well in some cases. The Bromide at bedtime.—Sir James Barr.

Tablets, 5 grains (**0·3 Gm.**) and 10 grains (**0·6 Gm.**).

Dose.—1 to 6 or more.

Effervescent Ammonium Bromide.

Dose.—1 drachm. Contains 5 grains.

Linctus Ammonii Bromidi. *Syn.* **Elixir Ammonii Bromidi.**

Dose.—1 to 2 drachms (4 to 8 Cc.). Contains 10%.

A palatable method of administering for throat affections.

Mistura Ammonii Bromidi, Phenazoni et Caffeinæ.

Dose.—One ounce (30 Cc.).

Ammonium Bromide 10 grains, Phenazone 10 grains, Caffeine Citrate 5 grains, Chloroform Water to 1 ounce.

Ordinary headache is rapidly relieved by this, repeated in two hours if necessary.—A. P. Luff, B.M.J. i./14,635.

Pastilli Ammonii Bromidi. 1 grain in each with Glyco-gelatin basis. For whooping-cough and throat affections.

Trochisci Ammonii Bromidi with Gum basis, containing 1 grain each, are very useful in asthma and for tickling cough.

Ammonii Carbonas. (*Off.*).

$NH_4HCO_3 : NH_4NH_2.CO_2 = 157{\cdot}122$.

Dose.—3 to 10 grains (**0·2 to 0·6 Gm.**).

White masses with ammoniacal odour and alkaline taste, consisting of **Ammonium Bicarbonate** and Carbamate. A stimulant, carminative and expectorant.

Soluble 1 in 4 water, 1 in 5 glycerin.

Incompatible with acids, iron salts and salts of alkaline earths For equivalents to acids *v.* Neutralisation Table.

Method of direct titration.—P.J. ii./05,864.

In broncho-pneumonia ½ to 1 grain doses useful, combined with a little potassium iodide or ammonium chloride, tincture of nux vomica and syrup of tolu. Even grain doses for infants of six months.—Cautley.

In bronchitis 30 grain doses were advised by the late Sir L. Brunton as emetic. Has advantage of being a stimulant :—

"In smaller doses it stimulates the secretion of gastric juice, may be used in atonic dyspepsia, flatulence, etc., as a substitute for alcohol. From its power of stimulating the respiratory centre, it is employed as a stimulating *expectorant* in chronic bronchitis, in the broncho-pneumonia of children, and in asthma depending on cardiac disease."

Ammonii Chloridum. (*Off.*). $NH_4Cl = 54{\cdot}50$.

Dose.—5 to 20 grains (**0·3 to 1·2 Gm.**).

White crystals soluble 1 in 3 of water.

Liquid extract of liquorice disguises its nauseous taste.

Incompatible with carbonates of alkalis and alkaline earths.

Flavoring.—Glyl Rosæ, Glyl Coriandri, Syl Lavandulæ, Syl Aurantii Amari ; Extractum Glycyrrhizæ, Syrupus Tolutanus.

For use as an anti-alcohol remedy, *see* Alcohol.

Lotio Evaporans *Syn.* **Lotio Ammonii Chloridi,** Gt. Orm. H.

Ammonium Chloride 15 grains, Alcohol 90% 1 drachm, Water to 1 ounce.

Tablets, 3 and 5 grains ; also 3 grains with Borax 2 grains.

Trochisci Ammonii Chloridi, T.H. 'F.' 2 grains, marked 'M.A. One every 3 hours useful in congestion of the pharynx and larynx, loss of voice arising from cold and bronchial cough.

Trochisci Ammonii Chloridi cum Glycyrrhiza.

Contain 3 grains of each. **Tablets** are also made same strength.

Trochisci Ammonii Chloridi Compositi, T.H. Contain Ammonium Chloride 1 grain, Potassium Chlorate 2 grains, and ¼ grain approximately of Cubebs. Marked 'C.M.A.'

Vapor Ammonii Chloridi is used in affections of the throat and Eustachian tube.

Inhalers, Ammonium Chloride.—Godfrey's, Basdon's, and Maw's are varieties on the market. They are all the same in principle, which consists in combining the vapour of ammonia and hydrochloric acid

Ammonii Iodidum, U.S. NH_4I=144·96.

Average dose.—5 grains (0·3 Gm.).

A white granular salt containing not less than 99% pure ammonium iodide in minute crystalline cubes, very deliquescent and soon becoming yellow or yellowish brown on exposure to air; odourless when white, with a sharp saline taste and a neutral reaction. ***Soluble*** 1 in less than 1 of Water, 1 in 3 of 90% Alcohol (by experiment). Should be kept from light and air, or free iodine is quickly liberated. It causes less depression than potassium iodide, and is preferred for syphilis and rheumatism.

Ammonii Nitras. NH_4NO_3=80·048 B.P. 1885.

The fused salt is used for making **Nitrous Oxide**, *Syn.* Laughing Gas. N_2O=44·046; on heating to 350° F. it splits up into this gas and water vapour.

The gas is passed through a strong solution of ferrous sulphate to remove nitric oxide—the traces of acid being removed by passing through alkali. The gas is considered one of the safest anæsthetics. The heart is not directly affected by its action.

There is no anæsthetic, if carefully given, comparable with nitrous oxide for quietly and pleasantly inducing anæsthesia.

Instructions for treatment if dangerous symptoms arise during administration of nitrous oxide.

Dangers arising under gas are almost invariably due to failure of the respiration caused either by obstruction or over dose. Obstruction may result from "falling back of the tongue," from pressure due to engorgement of the thyroid or thymus, or other glands in the neck, or from foreign bodies entering the respiratory passages—teeth, bloodclot, vomit, &c. Over-dose is more likely to occur if the patient's clothing be not loose.

If the breathing stop, give no more anæsthetic, clear the mouth and pharynx with a swab or towel round the finger, pull forward the tongue and compress the lower ribs; if no air enter or leave the chest, place the patient upon his side upon the floor, with a pillow or something equivalent under his shoulders. Loosen his clothing, pull the tongue forward and give the tongue forceps to an assistant to keep up the traction. Try to expel any possible obstruction by compressing the lower ribs and abdomen, and then turn the patient upon his back and begin artificial respiration, giving oxygen gas and applying nitrite of amyl or weak ammonia vapour to the nostrils meanwhile. If there be another assistant tell him to give an injection of strychnine ($\frac{1}{30}$ grain) or 1 drachm of ether or both, but do not stop the artificial respiration or waste time over the injection yourself. If no air enter or leave the chest during the artificial respiration, do tracheotomy forthwith, and immediately the trachea is entered resume the artificial respiration and continue it for at least an hour, keeping the patient warm during this time. R. D. H. has revised these instructions in some particulars.

Self administration of Nitrous Oxide, accidental death from.—L. ii./20, 1167. Pr. Mar. '22,164.

Nitrous Oxide and Oxygen for major surgery extensively used in the U.S. Discussion on value. Danger of asphyxiation, and dangerous shock may come on immediately after withdrawing the anæsthetic. For major operations this method is not favoured in this country (Sir F. Hewitt) —L. i./13, 333. The method is described by H. P. Fairlie and recommended for major operations. Results. Anæsthesia varying from 11 to 75 minutes.—Pr. Aug. '13,267.

H. M. Page said the special indications for the method are: (1) desperate cases from toxæmia, traumatism or hæmorrhage, if spinal anæsthesia were

not used ; (2) operations on diabetics ; (3) in certain genito-urinary operations. A previous injection of a narcotic with atropine is advised, and failing this atropine alone. Induction recommended to be always done with addition of Ether. H. Bellamy Gardner agreed as to use in diabetics, but not in favour of for abdominal sections.—L. i./13,459.

In major operations Teter gives as an average 100 gallons Nitrous Oxide and 20 gallons of Oxygen for one hour's anæsthesia. The temperature of the gases should be 85 to 90° F His apparatus consists of a stand carrying two cylinders each of Nitrous Oxide and Oxygen and an Ether attachment. The cylinders are in pairs, so that an empty one can be replaced without interfering with the administration.

For operations on regions other than the mouth or nose, injections of Atropine 1/150 to 1/100 grain, Morphine 1/8 to 1/6 grain are given hypodermically 1½ or even 2 hours before the inhalation. Crile and others add Scopolamine 1/200 to 1/100 grain. At first Nitrous Oxide with 2% Oxygen is given with a pressure of 4 to 40 m.m. of Mercury. More or less Oxygen is given according to circumstances—more if patient is cyanosed, less if he struggles. Unconquerable rigidity is controlled by giving Ether—this may occur in about 10% of cases.—D. W. Buxton's "Anæsthetics," 6th Edition.

As anæsthetic in dental work, the average quantity of gas used is 2 to 3 gallons and Oxygen 6—12 ounces. Portable apparatus for the gases. Results in dentistry better than with gas alone.—L. ii./12,1372, 1464.

In military surgery Nitrous Oxide and oxygen with rebreathing—stated to be infinitely better than Ether or Chloroform.—H. E. G. Boyle, L. ii./17,667.

Obstetrics. Use of Nitrous Oxide and Oxygen. Only a certain proportion of patients are able to be managed with analgesia in labour. It seems to demand great co-operation on part of patient.—J. Blomfield, Pr. Mar. 22,165. See also Pr. Dec. 1920,402.

Anæsthesia with Nitrous Oxide and Oxygen under pressure. An operating room could be built as a pressure chamber. The pressure would be about an extra half atmosphere and the gas 4, 5 or 6 to 1 of oxygen.—H. H. Dale and Leonard Hill, L. ii./21,326.

Ammonii Sulphas $(NH_4)_2SO_4=132{\cdot}144$.

Colourless crystals soluble 1 in less than 1 of water. Its chief use is as fertiliser and for fire proofing. It is made by distilling gas liquor with lime, into Sulphuric Acid and is a source of Ammonia for refrigeration and similar purposes.

Ammonii Valerianas. **Ammonii Valeras,** U.S. $NH_4.C_5H_9O_2=119{\cdot}139$. Fr. Cx. Another formula, — $NH_4.C_5H_9O_2+2C_5H_{10}O_2=323{\cdot}349$.

Dose.—1 to 8 grains (**0·06 to 0·5 Gm.**). In masses of flat colourless deliquescent crystals, with a strong valerian odour, very soluble in water and alcohol. A 25% aqueous solution is prepared for dispensing. *Soluté de Valérianate d'Ammoniaque Composé,* a French 'Nerve Tonic' (Fr. Cx. and P. Helv.), is Valerianic Acid 3, Ammonium Carbonate *q.s.* (about 4) to neutralise, Extract of Valerian 2, Water to 100 all by weight. *Dose.*—2 to 4 drachms (**7 to 15 Cc.**).

Linimentum Ammoniæ (*Off.*).

Solution of Ammonia 1, Almond Oil 1, Olive Oil 2. Shake together. Arachis or Sesame Oil may be used in parts of the Empire.

To make more fluid, mix the Almond Oil and the Ammonia Solution and the Olive Oil afterwards.

'Hartshorn and Oil' is usually Solution of Ammonia **1** and Almond Oil 3, shaken together.

Liquor Ammoniæ. *In Great Britain and Ireland to be labelled "Poisonous—Not to be taken," to be supplied in bottle distinguishable by touch.* For further conditions of Sale *v.* p. 48. '**Ammonia**' (*Off.*). has Sp. Gr. 0·959. This and

Aqua Ammoniæ, U.S., contain 10% by weight of NH_3. Fr. Cx.—**Ammoniaque Diluée** about the same.

Dose.—10 to 20 minims (**0·6 to 1·2 Cc.**).—(Not official.) *Average dose.*—15 minims (U.S.).

Hypodermic injections of 2 to 6 minims for collapse; or up to 36 minims for snake poisoning; internally is stimulant, diuretic and diaphoretic.

In embolism large doses of ammonia, well diluted, tend to reduce the coagulability of the blood.—Whitla, Pract. Med.

In a case of lateral sinus thrombosis, the wound, an extensive one—after operating and lavage, dressed daily with Cyanide Gauze soaked in a Soap Emulsion (Potash Soap 1 drachm, Soda Soap 1 drachm, Olive Oil 1 drachm, Distilled Water to 1 pint). An Ammonia mixture (5 minim dose) was given every 4 hours. In addition to its stimulating effects, Ammonia reduces liability to thrombosis by its action on the blood —P.R.S.M. Otol. Sect. Dec. '10

Liquor Ammoniæ Fortis. "*Poisonous—Not to be taken,*" *Cf.* Liquor Ammoniæ (*Off.*)

Dose.—3 to 6 minims (**0·2 to 0·4 Cc.**).

Contains 32·5% by weight NH_3. Sp. Gr. 0·888. (Aqua Ammoniæ Fortior, U.S. IX. contains 27 to 29%. **Ammoniaque officinale.** Fr. Cx. 20·18%.)

Ammoniaca *Soluzione*: in the body of P. Ital IV. is a 20% solution.

Haber, of Karlsruhe, succeeded in combining atmospheric Nitrogen with Hydrogen producing Synthetic Ammonia.—Na. Feb., 1911,560. Germicidal action, see *Vol. II.*

Capsules of Strong Ammonia, 3 minims in each.

Encased in cotton wool and silk. Are intended as a restorative—to be crushed and contents inhaled—a portable form of smelling bottle.

Enema Ammoniæ.—Strong Ammonia Solution 1, Water 160 (1 drachm to the pint).

In the treatment of post operative ileus and intestinal paresis—a sequel of abdominal operations most distressing to the patient. Its effect is enhanced by a dose of Pituitary Extract hypodermically given ½ hour previously. Effects a good motion and discharge of excessive flatus. Not to be used too frequently or in excess of above strength.—T. A. Black, L. ii./16,374.

Liquor Ammoniæ Domesticus (*vel* **Detergens**), **Household Ammonia.** *Signa*—"*Poisonous—Not to be taken.*"

Oleic Acid 1, Alcohol 1, mix and add strong Solution of Ammonia 7, Distilled Water 7; shake well. For use diluted as a detergent of the skin. In the bath 1 in 1,000 to 2,000 softens the water; also for general domestic purposes.

Cloudy Ammonia is made with tap water—for this the gravity of the preparation must not be too light, otherwise the lime salts constituting the 'Cloud' will settle down. We can recommend the following:—Dissolve Castile Soap 1·3, in Water 60, and add Strong Solution of Ammonia 27, Lime Water 0·6, and Water to 100.

Hair Lotion, Erasmus Wilson's.

Strong Solution of Ammonia 1, Almond Oil 1, Spirit of Rosemary (B.P. 1885) 4, Honey Water 2.

For alopecia areata Strong Ammonia Solution 1, Chloroform 1, Olive Oil 1, Spirit of Rosemary to 8, is useful.

Liquor Ammonii Acetatis (*Off.*).

Dose.—2 to 6 drachms (**8 to 24 Cc.**).

Keep in green glass stoppered bottles.

The neutral point may be found by trying effect on a little ammonium carbonate on a watch glass.

U.S. is similar and contains not less than 7% Ammonium Acetate.

Mistura Anti-Catarrhalis. BURNEY YEO.

Solution of Ammonium Acetate 3 drachms, Spirit of Nitrous Ether 1 drachm, Opium Tincture 10 minims, Ipecacuanha Wine 5 minims, Camphor Water to 1½ ounces. To be taken at night. Assists action of skin and kidneys.

Liquor Ammonii Acetatis Fortior. B.P. 1885.

Dose.—25 to 75 minims (**1.5 to 5 Cc.**). Ammonium Carbonate 1, Acetic Acid *q.s.*, Water to 4, *i.e.*, approx. 5 times as strong as the *Off.* Liquor.

Acetate d'Ammonium Dissous (Solution Officinale). FR. CX.

Contains 18·5% by weight of Ammonium Acetate.

Ammonii Acetas.—$CH_3.COONH_4$=77·074.

Dose.—10 to 30 grains (**0·6 to 2 Gm.**).

This salt is obtainable in white crystals, very soluble in water

Incompatible with mineral acids, alkaline carbonates, potassium chlorate and dichromate, mercurous nitrate.

Serviceable in all fevers and in delirium tremens, one drachm every hour at first, reduced gradually.

Choice of a diuretic—Ammonium Sodium and Potassium Acetates, Citrates and Tartrates, increase osmosis and are diuretics by stimulating the convoluted tubes of the kidney. They draw water from the tissues into the blood stream ; they do not irritate the kidneys and may be used even when the organs are acutely inflamed,—they should be well diluted. Useful to combine Spirit of Nitrous Ether with them, which, owing to the Ethyl Nitrite contained in it, is a useful agent in causing dilatation of the different vessels of the kidney. The action of these drugs, *e.g.*, in renal dropsy should be encouraged by sufficient doses of a watery aperient every day or other day, *e.g.*, Compound Jalap Powder.—B.M.J. i./11,289.

Mistura Febrifuga, N. H. W. (not in E. G. A.). Solution of Ammonium Acetate 2 drachms, Spirit of Nitre 20 minims, Sodium Bicarbonate 5 grains, Chloroform Water to ½ ounce.

Liquor Ammonii Citratis (*Off.*).

Dose.—2 to 6 drachms (**8 to 24 Cc.**).

Prepared by neutralising Citric Acid 10, with Ammonium Carbonate 7 or *q.s.* in Distilled Water *q.s.* to 80. Keep in green bottles.

Liquor Ammonii Citratis Fortior. B.P. 1885.

Dose.—30 to 90 minims (**2 to 6 Cc.**).

Was four times as strong as the present liquor (above).

Ammonii Citras.—$C_3H_4.OH(COONH_4)_3$=243·19.

This salt is a deliquescent white powder, diuretic, and acts similarly to the acetate. *Dose.*—30 to 60 grains (**2 to 4 Gm.**).

In pneumonia a mixture of the following : Solution of Ammonium Citrate 30 minims with Potassium Iodide 4 grains and Potassium Citrate 10 grains, in a tablespoonful of water every four hours,—an 8 ounce bottle made up as above proved an efficient treatment for the eventh time in a bad case.—L. i./09,160.

Ammonii Tartras $(CHOH)_2(COO)_2(NH_4)_2 = 184{\cdot}132$.

White crystals soluble in water.

Irrigation (under Cocaine initially) with 5 to 10, and ultimately 20% solution, in a case of erosion of the cornea,—complete clarification.—M. /08,128.

Spiritus Ammoniæ Fetidus (*Off.*).

Asafœtida 75, Strong Solution of Ammonia 100, Alcohol 90% to 1,000 Distil.

Spiritus Ammoniæ, U.S. VIII. *Syn.* **Alcohol Ammoniatum.** *Average dose.*—15 minims. A solution containing not less than 10% ammonia by weight in alcohol 90%. Sp. Gr. 0·808 at 25° C.

Uses.—Similar to Sal Volatile as stimulant, but not so palatable.

Flavoring.—Syl Menthæ Piperitæ, Syl Limonis, Syl Coriandri (all double dose) ; Syrupus Zingiberis (not so good).

Spiritus Dzondii, Ph. Bor. is a similar preparation.

Spiritus Ammoniæ Aromaticus (*Off.*).

Dose.—20 to 40 minims, for repeated administration ; single, 60 to 90 minims.

Contains approximately 2·4% by weight of NH_3. That of U.S. contains Ammonium Carbonate 3·4, Ammonia Water 9, Lemon Oil 1, Lavender Oil 0·1, Nutmeg Oil 0·1, Alcohol 70, Water to 100 and is not distilled.

Liquor Ammoniæ Aromaticus (Simplex).

Ammonium Carbonate 4 ounces, Strong Solution of Ammonia 8 ounces, Terpeneless Oil of Lemon 13 minims, Terpeneless Oil of Nutmeg 54 minims, Alcohol (90%) 6 ounces, Distilled Water 149 ounces. The Oils to be dissolved in the Spirit before adding to the rest of the mixture. The liquor has been suggested as being useful in ' Stock Mixtures '—*i.e.*, for Hospital work, etc., where the saving of Spirit is a consideration.

This preparation mixes perfectly clear with water as distinct from the official Spirit. It is not so pungent to the taste as Sal Volatile.

Liquor pro Spiritu Ammoniæ Aromatico.

For dilution 1 with 3 of a mixture of Alcohol (90%) 12 and Water 1.

Dissolve Ammonium Carbonate 4 ounces in Water 20 ounces. Add Strong Solution of Ammonia 8 ounces then Terpeneless Nutmeg Oil 54 minims and Terpeneless Lemon Oil 13 minims in Alcohol (90%) 10 ounces.

May also be prepared for dilution 1 *with* 2 with the same Alcohol mixture as for the ' 1 with 3 ' preparation above. In this case proceed as for the latter, but dissolve the Ammonium Carbonate in Water $21\frac{1}{2}$ ounces and the Oils in Alcohol 90% $21\frac{1}{2}$ ounces. This is clearer than the above.

Note.—It is not practicable to make a Concentrated Liquor for dilution with *Water only*. Our experiments show it is not possible to make the Concentrated Liquor much stronger in Alcohol than is contained in the above, as the Ammonium Salts are thrown out.

AMYGDALA AMARA. (*Rosaceæ.*)

Bitter Almond. (*Off.*).

Oleum Amygdalæ (*Off.*) is expressed from the seeds (Peach or Apricot kernel Oils, or mixtures are sold commercially as Oleum Amygdalæ Persicæ*), which yield about 40%†, and the residue is utilised for the production of Essential Oil of Bitter Almonds (**Benzaldehyde,** C_6H_5COH = 106·083, or Oleum Amygdalæ Essentiale *sine* Acido Hydrocyanico). **Benzaldehyde** is official in P.G.V., U.S. and P.Jap. IV. *Dose.*—½ minim (**0·03 Cc.**). In latter case produced artificially or as above, containing not less than 85% Sp. Gr. 1·045 at 25° C. B. pt., 179° to 180° C. Tests for hydrocyanic acid and chlorinated products and assay process are given in U.S. Is a flavouring agent—non-poisonous. The Essential Oil containing the Hydrocyanic Acid to the extent of about 5% is also prepared and must be carefully distinguished from this. (That ordered by U.S. contains not less than 2 or more than 4%.) The glucoside **Amygdalin** $C_{20}H_{27}NO_{11},3H_2O$ = 511·372 (P. Svec.)—crystals soluble in 12 parts of water with slightly bitter taste and neutral action—under the influence of **Emulsin**‡, a constituent in the seeds, of the nature of a ferment, hydrolyses (takes up water) on coming in contact with it, forming grape sugar and Benzaldehyde-hydrocyanic Acid, $C_6H_5COH+HCN$ = 133·104. This latter compound is decomposed and the Hydrocyanic Acid is removed so as to produce the above Essential Oil suitable for flavouring purposes. A similar body to Amygdalin, or one identical with it, is contained in *Prunus Laurocerasus.* (Cherry Laurel Leaves).

℗1**Aqua Laurocerasi** is standardised (*Off.*, Fr. Cx., P.G.V. and F.I.) to 0·1% Hydrocyanic Acid. It also contains some Benzaldehyde. *For analytical data, vide Vol. II.*

It is liable to variation and is unsuited to make eye lotions.—C. M. Caines, P.J. ii./22,91.

℗1**Aqua Pruni Macrophyllæ** (from fresh *Bakuchi* Leaves). P. Jap. IV. contains also 0·1% Hydrogen Cyanide.

℗1**Aqua Amygdalæ Amaræ** should contain the same amount of Hydrocyanic Acid.—F.I., P.G.V., and P. Jap. III. (now omitted). (U.S. is 1 of oil of bitter almonds shaken in 1,000 of water and filtered.) *Average dose,* 1 drachm.

F. Norsk gives a "synthetic" Bitter Almond Water, viz.:—
Oil of Bitter Almond 4, Hydrocyanic Acid (2%) 50, Alcohol (90%) 146, Distilled Water 800. Contains 0·1% HCN.

Amygdalin is also contained in the bark of *Prunus serotina* (Virginian Prune or Wild Cherry bark), and the same action occurs when this drug is bruised with water.

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*℗1*Almonds, Essential Oil of (unless deprived of Prussic Acid), also preparations or admixtures containing.*

Bieber's modified Nitric Acid Test indicates presence of small quantities of Peach Oil in Almond Oil. *cf.* B.P.

There is no pharmacological difference between this oil and the expressed oil of almonds. Kernel oil has the higher Iodine No., *vide Vol. II.*

† Content of fatty oil in sweet almonds 45·3-67·1%, average being 58·9%. In bitter almonds 35·5%, to 62·5%, average 51·3%.—P.J. i./23,324.

‡ See also Enzyme Table, Vol. II.

Solubility.—Almond oil dissolves in all proportions in chloroform, about 1 in 2½ of ether and slightly in alcohol 90%.

Spiritus Amygdalæ Amaræ, U.S. *Average dose.*—8 minims. Oil of Bitter Almond 1, Alcohol 80, Distilled Water to 100.

Amygdala Dulcis also yields about the same amount of Oleum Amygdalæ (*Off.*) and contains Emulsin, but is free from Amygdalin.

Pulvis Amygdalæ Compositus (*Off.*).—Sweet Almonds powdered (*s.a.*) 6, Refined Sugar 3, Powdered Gum Acacia 1.

Mistura Amygdalæ (*Off.*) contains of this Powder 1, Water to 8, rubbed smooth and strained.

Emulsum Amygdalæ, U.S.—*Average dose* 4 ounces. Sweet Almonds 60, Acacia Powder 10, Sugar 30, Water *q.s.* to 1,000.

Sterilised Almond or **Olive Oil** (**Oleum Asepticum, L.H.**), or **Liquid Paraffin** intended for hypodermic injection (Olive Oil for subcutaneous feeding L.H.), or lubricating catheters, is prepared by sterilising the oil in small flasks or bottles tightly plugged with cotton wool at 120° —140° C. for ½ hour.

Physicians and Surgeons should specify which oil is to be employed for 'Sterilised Oil.'

Acidity of stomach contents is diminished by consumption of neutral liquid fats before food—the more so, the greater the tendency of the secretory activity to exceed the normal. In several degrees of digestive or continuous hyper-secretion, often associated with chronic ulcer about the pylorus or duodenum, in which heartburn, acid pyrosis, sudden gnawing pain in the epigastrium ascribed to pyloric spasm, and the vomiting of acid fluid. *Dose* of the sterilised olive or almond oil—1 ounce first thing in the morning, repeated before subsequent meals if necessary. It is also valuable as nutritive, and is well tolerated.

Whooping-cough often relieved by instillation of oil into the nostrils. Systematic hygiene of the upper respiratory tract desirable, so as to inhibit growth of any micro-organism.—L. i./09,35.

AMYL NITRIS (*Off.*).

Amylis Nitris, U.S., P.G., Ph. Ned., 80% pure (**Amylium Nitrosum, P. Austr., P. Belg., P. Jap., P. Hung., P. Ital. IV.**).

$C_3H_{11}NO_2$=117·121.

Dose.—By inhalation, the vapour of 2 to 5 minims (**0·12 to 0·3 Cc.**) up to 10 minims—*Martindale.* By the mouth, ½ to 1 minim (**0·03 to 0·06 Cc.**). Hypodermically, 1 to 5 minims (**0·06 to 0·3 Cc.**).

A yellowish ethereal liquid with a peculiar not disagreeable odour; produced by the action of nitrous acid on amylic alcohol boiling between 128 and 132° C. and consisting chiefly of iso-amyl nitrite. —Sp. Gr. 0·870 to 0·880; not less than 90% distils below 212° F. Amyl Nitrite is ***soluble*** in alcohol but insoluble in water. Should be kept cool; by exposure to the air it becomes comparatively inert.

For Assay see Vol. II.

Incompatible. — Alkaline Carbonates, Potassium Iodide, Bromides and Ferrous Salts.

Pharmacology.—Amyl nitrite dilates the vessels and lowers blood-pressure. In 30 to 40 seconds after inhaling or swallowing a dose it flushes the face, and increases the heat and perspiration of the head and neck.

The effect on the pulse can be shown within ten seconds of inhalation. This is due to the large area of the lungs absorbing the drug—roughly 100 sq. meters—and to the thinness of the membranes (about $\frac{1}{1000}$ m.m.) separating the air of the pulmonary vesicles from the blood.

The action of Amyl Nitrite and the Nitrites generally in relaxing arterial tension, was discovered experimentally by Rutherford and Gamgee. This led Sir Lauder Brunton to the discovery of its value and that of Nitroglycerin for relief of anginal spasm.

He first used Amyl Nitrite in angina pectoris in the winter of 1866–67. During an attack in this case the pulse became very quick and the pulse tension considerably raised. This rise of pressure he attributed to contraction of the arterioles. The success of the remedy proved the truth of the theory which led him to administer it.—L. ii./15,163. With the inhalation of Amyl Nitrite the vessels dilated and the pain passed off. It is now used for all varieties of cardiac pain, especially when it comes on in paroxysms.—H. W.

Amyl nitrite *cannot be deemed dangerous* in use in any way. Murrell writes—'A patient took a teaspoonful, vomited in a few minutes and seemed none the worse—another took 4 drachms and recovered—I know of no fatal case.'

Uses.—It has been successful in relieving angina pectoris, sea-sickness, ague, spasmodic asthma, migraine, neuralgic dysmenorrhœa, post-partum hæmorrhage, tetanus, as an antidote to chloroform, to ward off epileptic attacks, and for the spasm of false croup and whooping-cough, and in cocaine and strychnine poisoning. Is largely employed in threatened fainting and collapse, and as a restorative after gas in dental extractions. It is valuable to restore animation in doubtful cases of death, as from drowning.

Amyl Nitrite Sterules, *Martindale.*

Encased in cotton wool and silk; 1, 2, 3, 4, 5, 6, or 10 minims (0·06, 0·12, 0·2, 0·25, 0·3, 0·4 and 0·6 Cc.)

In use the glass capsule is broken, the liquid soaks the cotton wool and silk cover, and can be inhaled most conveniently. The 3-minim size meets most wants.

The contents of these sterules do not deteriorate on keeping. On the contrary, capsules 17 *years old were found to be fully active.*

Fr. Cx. has **Azotite d'Amyle.**—

"Preferably preserved in Sealed Capsules."

U.S. and P. Jap. also direct to be kept in the same manner.

In Angina Pectoris the best form for administration of Amyl Nitrite is the glass capsule, several may be used as there is practically no danger from its administration.—Whitla, Pract. Med.

Pseudo-angina occurring, as a rule, in the young, not serious with regard to patient's life, and is not relieved by the Nitrites—it requires tonic treatment and exercise; true angina requires the Nitrites and Iodides. Brunton observed that rise in tension occurred along with angina and probably caused it.—B.M.J. ii./09, 1128.

A medical man who has frequent occasion to use the sterules himself describes them as a 'Godsend.'

Causation of Angina Pectoris.* A clinical lecture by Byrom Bramwell refers to this. The exciting causes to angina pectoris are increased muscular effort and conditions which produce increased pressure in the peripheral arterial circulation—that is, conditions which throw an increased strain (either actual or relative) on the left ventricle.

Clifford Allbutt lays down the rule that everyone of forty and over should at intervals of five years or so have his blood pressure measured in order that he may know in time if he be tending towards arterio-sclerosis. A man of, say 45, in whom a systolic pressure of some 160 m.m. of Mercury be found may seem well but has probably a slight increase in amount of urine,—which will be too watery and may show a trace of albumin occasionally and probably now and then a few hyaline casts. Cut down animal proteids, give lacto-vegetarian diet, cut off excessive smoking and Alcohol, give a saline purge every morning with an occasional mercurial purge and the pressure will come down to normal or nearly so. If this is not sufficient Potassium Iodide will help. It probably helps in elimination. Not by any means a general rule, but occasionally high blood pressure may need use of vasodilators.

Vasodilators usually act even in profound cases of arterio-sclerosis, and Wallace and Ringer showed that their action is more prolonged here than in normal vessels. They may be placed in the following order as to speed of action and associated evanescence or effect :—

Amyl Nitrite, Nitroglycerin, Spirit of Nitrous Ether, Sodium Nitrite, Erythrol Nitrate, and lastly and more lasting Mannitol Nitrate.

In tobacco angina, useful.—Osler.

In chloroform syncope, Amyl Nitrite affords the quickest means of restoring the heart's action ; and the sterules are the most convenient form of using it.

Longevity. An early recognition of excessive tension is one of the important steps towards this (Hill and Barnard's and Oliver's Sphygmomanometers indicate the oscillations readily and are recommended). The systolic pressure is taken to be that which suffices to stop the pulse altogether, and the diastolic that at which the index gives the maximum oscillation. Brunton found normal systolic 100–120 m.m. for young adults, 115–135 or 140 for men in middle life and above 150 is abnormal. To lower pressure potassium iodide and cholagogues, &c., are used, but Amyl Nitrite and isobutyl nitrite have more rapid action than any other drug and are useful in cutting short paroxysms of pain. Nitro-glycerin can be given in divided doses during the day and keeps the tension low. Erythrol Nitrate has a still slower and more prolonged action.—L. ii./06,1335.

Amyl Nitrite is sometimes said to be ineffective in angina pectoris —in such cases it is questionable whether it has been given in sufficient doses. A case is mentioned where three times the maximum B.P. dose was not sufficient to bring about the fall in pressure.—This is a case in which the spasms are very frequent and Amyl

Nitrite relieves for a short time but not long enough. It is probable, from the curve, that the spasm is of central origin, that it is really a sort of convulsion of the vaso-motor centre.—Cushny.—"Experimental Pharmacology in regard to treatment." P.R.S.M. Therap. Sect., Nov. '10, p. 1 *et seq.*

The nitrites have been used in many cases of aortic disease for a great length of time with marked relief of urgent symptoms and with no indication of prejudicial effects.

HÆMOPTYSIS arrested in every case in which Amyl Nitrite was tried, whether of mitral obstruction or from phthisis. Normally the effusion of blood irritates the lung tissue, causing coughing. The strain raises the blood pressure, inducing fresh bleeding. A vicious circle is in this way maintained till eventually the loss of blood becomes so great that the exertion of coughing no longer causes a marked rise of pressure, then the bleeding ceases. Amyl Nitrite accomplishes the same effect without further loss of blood.—Edin. Med. J. July, 1904; L. ii./04,522,942,1446; M.A. 1906,240; B.M.J.E. i./06,79. In severe hæmoptysis—rupture of an atheromatous pulmonary vessel—free use satisfactory.—B.M.J. i./06,917.

The general vasodilation produced is preferable to the vaso constriction effected by Adrenalin internally.—L. ii./04,1446.

POST-PARTUM HÆMORRHAGE arrested.—B.M.J. ii./06,1125.

Invaluable but must be used with caution. During parturition Chloroform as is well known, is safe owing to the tension within the abdominal cavity, but it is dangerous given shortly after delivery, on account of the sudden withdrawal of this tension, which is liable to cause paralysis of the vasomotor mechanism, thus permitting the blood to accumulate in the splanchnic area. L. Hill has pointed out that Amyl Nitrite, if incautiously given, may produce the same effect.—A. T. Brand and J. R. Keith, "Clinical Memoranda for General Practitioners," 1923.

Hæmorrhage from bullet wounds in the chest, *e.g.*, in battle, can be controlled by inhalation of 5 minim capsule.—L. ii./07,941.

In hæmoptysis amyl nitrite acts better the quicker it is used. In most cases it can be completely arrested if inhaled as soon as the first signs of blood show themselves in the sputum. If excitement afterwards of any kind, ¼ grain Morphine given. Amyl Nitrite, the drug *par excellence*, to be used first. Especially useful in sanatorium work where the patient is seen at the beginning of attack.

In pulmonary hæmorrhage resort at once to Amyl Nitrite after ¼ grain Morphine Tartrate hypodermically. The cough slackens and hæmoptysis decreases.—J. W. Allan, Glas. Med. Jl. Nov., 1913.

In cerebral hæmorrhage Amyl Nitrite would appear to have advantage over venesection. It was found that in animals the drug stimulated the respiratory centre in addition to decreasing the blood pressure. It may be possible with this drug in man to cause a temporary fall of blood pressure without prejudicially affecting the respiratory centre as may occur with venesection. Philip Hamill, Clin. Jnl., July, '14,430.

In uterine hæmorrhage is efficient. 5 cases reported. Can be used to control flooding at periods. By dilating the arterioles generally it diminishes the peripheral resistance; thus reduces general blood pressure, and thereby the vascular distension of the uterine mucosa. May prove of value in tiding over fibroid disease until the menopause, without necessity for major operation. *Obviously patients should be prevented from using to arrest normal flow.*

In tetanus, inhale at every spasm to gain time.—L. i./09,103.

Infantile convulsions are well treated by inhalation of 1 minim doses. A whiff of Amyl Nitrite sometimes cuts the attack short.—Whitla, Pract. Med.

A powerful agent to relax uterine spasms and hour-glass contraction, whether natural or caused by ergot.

Epilepsy well treated, controlling the fits and preventing insensibility.—B.M.J. ii./89,599,688.

In uræmic asthma, found useful.—B.M.J. i./83,811,956,1064,1115.

Asthma is relieved by Amyl Nitrite relaxing the peripheral vasoconstriction which is an essential factor in the bronchial vascular distension responsible for the obstruction in respiration.—L. i./07, 189. Pr., Oct. 1910, p. 529. Clin. Jl., Aug. 1909. After the relief the patient usually no longer suffers from cold hands and feet. Brilliant results follow the removal of polypi from the nose—this has a marked effect on blood pressure.—B.M.J.ii./11,1327.

In croup prompt in action.—Whitla, Pract. Med.

In hiccough sometimes gives good results.—*ibid.*

Fear of death entirely disappeared as patient knew he would get relief from Amyl Nitrite or Nitroglycerin. Angina much more common amongst the rich than the poor, associated as a rule with gout.—L. ii./09,572.

In cardiac displacement. A case of severe attacks of dyspnœa which occurred every two days, a history of pleurisy. As a result of the adhesions, the heart was anchored much outside the usual position. Amyl Nitrite advised, which patient used (5 minims) during next attack, this so allowed the heart to act ' as it were being pulled right out ' that it broke away from its false moorings. Patient able to bend with ease which was previously impossible. No further angina attacks which previously occurred every two days or so. Further treatment Strophanthus Tincture, which brought the heart back to normal position.—J. C. McNaughton, B.M.J. ii./12,181.

Intrathoracic aneurysm. For the acute anginal attacks—Amyl Nitrite inhalation followed by internal use of Nitroglycerin or Erythrol Nitrate $\frac{1}{4}$ or $\frac{1}{2}$ grain is generally efficacious.—F. De Havilland Hall, L. i./13,948.

Hysterical aphonia. Vasodilators (Amyl Nitrite and Nitroglycerin) used in, with success. A woman lost her voice for several days. After a few doses of Nitroglycerin 1/100 grain, aphonia disappeared and did not return. A girl of 18 had been aphonic for a year with varied treatment unsuccessfully. On inhaling an Amyl Nitrite capsule her voice instantly returned. Also used *per os* with Sodium Nitrite.—J. R. Keith, B.M.J. i./15,847.

As a DIAGNOSTIC TEST OF MITRAL STENOSIS. Its action like that of exercise is to increase the flow of blood through the A—V ring which favours the production of the murmurs in question. Inhalation of a 3 m. capsule will often bring to light a clear presystolic or full diastolic murmur in a patient lying on his back, rendering early mitral stenosis diagnosable.—R. A. Morison, B.M.J. i./18,452. See also T. Fisher, *ibid*, 577

Purulent pericarditis simulating angina pectoris. Patient when first seen was in an almost moribund condition. Pulse could not be felt; heart apparently beating feebly and irregularly at about 50. Strychnine and Camphor were injected with little improvement, but there was prompt response to *Amyl Nitrite*. At autopsy the pericardium was found to contain about 2 ounces of hæmorrhagic sero-purulent fluid. The man was probably killed by angina pectoris, but this condition was excited by the unrecognised pericarditis.—M. A. Cassidy, R. O. Moon and F. Le Q. Pelly, L. ii./21, 559.

Pulmonary embolism. Death from, after abdomino-perineal excision. Patient seized with urgent dyspnœa. Was kept alive with Oxygen and Morphine. "If Amyl Nitrite had been available, would have employed it."—Sir C. Gordon-Watson, Pr. June 22/393.

Sterules, Hypodermic, contain 15 minims (1 Cc.). (Note the hypodermic *dose* is 1 to 5 minims.) Useful when inhalation is impracticable.

Amyl Nitrite in conjunction with **Pilocarpine Hair Lotion** (*q.v.*) has been used to increase the growth of the hair. Employ Amyl Nitrite 10% in Alcohol 90%. To be rubbed in the scalp alternate nights.

ANTIMONIUM.

Sb=120·2.

Antidotes to Antimony Compounds.—Stomach tube (for Tartar Emetic, but not for Butter of Antimony), emetics, tannin or tea followed by stimulants.

Accidental poisoning by. A case recorded with recovery. Child was fed with milk and white of egg for the first 24 hours, afterwards barley water. A mixture of Compound Tincture of Cinchona and Tincture of Calumba was given.

Impalpable powdered antimony. Patent process described; suggested for use by injection.—P.J. i./11,293 (*vide* our p. 181).

Stibnite (Antimony ore) shipped from Alaska.—Mining Jl. per P.J. i./16,623.

ℙ1 **Antimonii Arsenas.**

Dose.—$\frac{1}{100}$ to $\frac{1}{30}$ grain (**0·0006** to **0·002 Gm.**) twice or thrice daily. *Max. single dose.*—$\frac{1}{30}$ grain (**0·002 Gm.**); $\frac{1}{3}$ grain (**0·02 Gm.**) in 24 hours.—M. A.

A mixture of Antimonic Oxide and 20% Arsenic Acid; a heavy white powder. Used in syphilis and skin eruptions. Nervine and muscular tonic. Is a constituent in Gélineau's Dragées.

Dose of these is one twice a day, increased to three, after meals.

For further details of composition see Vol. II.

Antimonium Sulphuratum (*Off.*). A mixture of the sulphides and oxides in orange red powder.

Uses.—Diaphoretic. In syphilis and skin affections.

Stibium Sulfuratum Rubrum, P. Belg. *Syn.* **Kermes Minerale** is made by boiling black Antimony Sulphide (Trisulphide) with Sodium Carbonate Solution, and allowing the liquor to cool.—Fr. Cx. similar. **Tabellæ**, P. Belg., contain 0·01 Gm.

Dose.—1 to 2 grains. ***Incompatible*** with sodium bicarbonate and potassium acid tartrate.

Antimonii Pentasulphidum. Pentasulfure d'Antimoine, Fr. Cx Sb_2S_5=400·7.

Made by decomposing Schlippe's Salt with dilute Sulphuric Acid.

Antimonium Nigrum Purificatum. B.P. '98. Sb_2S_3=336·58.

Greyish crystalline powder, decomposed by boiling hydrochloric acid. Used in veterinary practice as parasiticide.

Antimonii Oxidum (Antimonious Oxide) Sb_2O_3=288·4.

Dose.—1 to 2 grains (**0·06 to 0·12 Gm.**).

A heavy white powder, soluble in Hydrochloric Acid and in Alkaline Tartrate Solution, Caustic Potash, etc. Is expectorant and emetic.

Injectio Antimonii Oxidi.—*Martindale.*

Dose.—15 to 30 minims (**1 to 2 Cc.**). *Subcutaneously, intramuscularly, or intravenously, increased as required.—Vide* Refs. *infra.*

These doses contain $\frac{1}{100}$ and $\frac{1}{50}$ grain respectively in a solvent of Glycerin and Water, equal parts. *Note.*—20 Cc. contain $\frac{1}{5}$ grain Antimony Oxide=$\frac{1}{2}$ grain nearly of Antimony Potassium Tartrate.

In making the injection the Antimony Oxide in fine powder, is carefully heated with the Glycerin, taking care to prevent the decomposition of the solvent, the water being added to the glycerin solution (warm). This produces a permanent preparation.

It is not possible to increase the strength of the Injection when a glycerin and water solvent is used: it is practically a saturated solution. For a stronger preparation a solution in 75% Glycerin, diluted at time of use, is suggested, *v. Injectio Antimonii Fortior.*

The preparation is apparently a chemical combination in the form of **Glyceryl Antimonite** (*cf.* G. T. Morgan, "Organic Compounds of Arsenic and Antimony," 1918, p. 295).

Uses.—It will be noted with regard to content of Antimony in the dose that the amount suggested has been on the side of caution, and though even with these small quantities the preparation has proved effectual in Leishmania infections, and trypanosomiasis, nevertheless stronger doses could undoubtedly be tolerated and in infections by parasites of the nature of Bilharzia, would be as effectual, if not more so, than Antimony Potassium Tartrate, which has been so successful in $\frac{1}{2}$ to 2 grain doses. The literature, however, shows that the preparation in dose equivalent to even 1/20th grain Tartar Emetic, is active. This is of importance when treatment has to be extended over long periods.

In these Glycerin Injections the Antimony is in a labile condition and hence *reactive*—a body of the nature of **Glyceryl Antimonite**

is more easily broken up than, for example, Antimony Potassium Tartrate or Antimony Sodium Tartrate where the component radicals are strongly linked together.

It would be of interest to try the preparations in syphilis and in malaria.

The following are abstracts from papers which have appeared :—

C. W. Daniels and H. B. Newham pointed out that successful treatment of these tropical protozoal infections (trypanosomiasis, etc.) entails keeping the disease under control possibly for two years. A case of Rhodesian trypanosomiasis was first treated with atoxyl subcutaneously and antiluetin *per os*. Trypanosomes were easily found in peripheral blood and varied from 1 or 2 to 20 per 200 leucocytes. Antimony Potassium Tartrate intravenously was given and for two or three days afterwards no trypanosomes were seen, but they recurred to the extent of 6 to 24 per 200 leucocytes on the 3rd or 4th day.

From December 8th, 1915, 2 Cc. of the Injectio Antimonii Oxidi were given (= 1/20 grain Tartar Emetic) daily subcutaneously and no trypanosomes were found until the 14th (2 per 200 leucocytes) and on the 15th, 3 per 200 leucocytes. On the 16th 2 Cc. of the injection were given twice a day and no trypanosomes were found for a fortnight (the date of the letter).

These subcutaneous injections are painless and can be repeated and cause no trouble whilst intravenous injections are of the nature of an operation to the patient and continued intravenous injections are painful—extended use of the preparation is thought well worth while.—L. i./16,102.

Trypanosomiasis. "The preparation is good and practically painless" for this and in the treatment of Kala azar and oriental sore. Thought curative action inferior to Tartar Emetic, but details of *extent* of treatment are wanting in the paper. Further, comparison is made apparently between 2 Cc. doses of the Oxide Injection (containing 0·0013 Gm. of Oxide) and 2 to 10 Cc. of 4% Tartar Emetic. —A. Castellani, B.M.J. ii./16,552 *et seq.*

Dr. Escomel (Arequipa, Peru) writes as follows :—

American leishmaniasis has in the past been treated by injecting Antimony Potassium Tartrate intravenously. For the treatment of furunculosis orientalis and Kala azar, Injection of Antimony Oxide has been suggested. It is non-caustic.

I have tried the preparation in American leishmaniasis with promising results. The injection may be subcutaneous, intramuscular or intravenous, the last mentioned being the most rapid. I have given *from 1 to 2 Cc. on alternate days or from 5 to 6 Cc. of the solution weekly.* The former method (alternate days) appears to have a more lasting effect.

No local or general reactions were observed notwithstanding that the injections were made at the surgery, whence, after a quarter of an hour's rest, patients returned home. This procedure is not possible with Tartar Emetic. No bad effects are produced beyond a certain amount of pain which is transient.

In certain cases the treatment has been supplemented by local treatment with Tartar Emetic powder on the wound. Cicatrisation of all cutaneous lesions and of most of the mucous lesions was effected in one case by the Antimony Oxide Injection and the external action of Tartar Emetic, while extensive ulceration on the foot in a case of long standing healed completely under the Injection, without local treatment other than the applcation of Zinc Oxide ointment.

Ulceration in a further Leishmania case invaded the whole nasal mucous membrane, the roof of the mouth and the back of the palate. It had existed six months before Antimony Oxide treatment was started. On the 10th September, 1916, the first dose (1 Cc.) was given subcutaneously without untoward reaction. Then at intervals intramuscularly, intravenously and subcutaneous doses of 1 to 2 Cc. Cicatrization commenced after three months and patient improved. Subsequently 6 Cc. were given intravenously on two occasions. No fever or local reaction. Cure of facial cutaneous region complete. Further doses effected cicatrisation of the mucous lesions.

The preparation clearly has advantages over Tartar Emetic and has cured American leishmaniasis, but was not successful in a case of blastomycosis in which latter Tartar Emetic also failed.—Esmundo Escomel, L. ii./17,355.

Dr. Escomel reported further (L. i./18,592) on four fresh cases successfully treated with the Injection :—

(1) A Spaniard aet. 38 with leishmaniasis lesion on the nasal septum and the forearm. Cured by 1 to 2 Cc. injections until a *total* of 30 Cc. had been reached with local treatment by tartar emetic (saturated solution).

(2) Peruvian aet. 22. Initial lesion two years ago at the lower and external part of the leg. Intense lesions of the entire mucous membrane of the nose and mouth. He received a *total of* 58 *Cc. of the Injection intravenously with apparent cure.* He continues the treatment in order to avoid relapses.

(3) Peruvian aet. 23. Ulcer on foot. Mucous membrane of the nose, mouth and tonsils much ulcerated. *After a total of* 35 *Cc. of the Injection, patient considered himself cured.* Two months afterwards there was a relapse commencing on the foot and in the mouth. After a few injections the ulcers healed, but we continued the injections as precaution until 80 Cc. of the injection had been given intravenously.

(4) Peruvian aet. 20. Leishmaniasis of the contour of the ear 15 *Cc. of the Injection intravenously* (1 *or* 2 *Cc. per injection*) and two applications of saturated solution of tartar emetic effected cure.

Surg. Rear-Admiral Sir P. Bassett-Smith employed the injection in a case of trypanosomiasis. The dose employed to begin with was 4 Cc. (containing $\frac{1}{25}$ grain of Oxide) increasing to 12 drachms (42·6 Cc.), (containing $\frac{2}{5}$ grain); this was given as an intravenous injection once a week.

As this involved the injection of a considerable quantity of solution, a more concentrated preparation was employed, viz., 1 grain (**0·06 Gm.**) in 4 Cc. of pure glycerin. This was diluted by him four times, viz., to the proportion of 1 grain (**0·06 Gm.**) in 16 Cc. Of this 2·5 Cc. (=$\frac{1}{6}$ grain Antimony Oxide approx.) were given *intramuscularly* without ill effect.

The object was to give the concentrated intramuscular dose alternately with the intravenous one—the latter has the highest sterilising effect on the blood, but it is not so lasting for killing off "hidden away" trypanosomes.

Trypanosomiasis apparently cured after treatment with various arsenicals, Antimony Tartrate and Oxide.—G. C. Low and H. B. G. Newham, B.M.J. i./22,96.

Surg. Rear-Admiral Sir P. Bassett-Smith deals further with a trypanosomiasis case. Patient served in B.E.F. in Cameroons and was infected with *T. gambiense.* At one time he had 4,000 trypanosomes per c.mm. of blood. Under intravenous injection of Antimony Oxide the blood rapidly *cleared.* In May, 1917, he was again admitted for further course of Antimony as there was relapse, which rapidly cleared up. Each spring of 1918, 1919 and 1920, he had a course of 10 injections of Antimony Tartrate ½ to 2 grains. Patient now working. It was a severe *T. gambiense* infection cured by Antimony.—B.M.J. i./22,311.

Injectio Antimonii Oxidi Fortior—*Martindale.*

Suggested dose, to be used with extreme caution, 8 to 15 minims (**0·5 to 1 Cc.**) ***diluted*** with 2 or 3 vols. of water and injected immediately, subcutaneously or intra-muscularly.—*See Animal Experiments, p.* 174.

A solution in 75% Glycerin of *strength* 0·5% w/v, i.e. 0·005 Gm. in 1 Cc. or 1/12th grain in 15 minims. 1 *Cc. is equivalent to* 0·012 *Gm* (3/16 *grain approximately*) *Antimony Potassium Tartrate.*

In making the solution, slight heat is employed as mentioned in the previous preparation, neutralising any acidity by the addition of N/1 Sodium Hydroxide.

Chemical and Physiological Note.—The antimony is in a relatively loosely combined condition and hence *reactive.* On dilution with blood serum it is admitted a reduction takes place. Nascent Antimonious Oxide will be precipitated in a fine state of subdivision—ready for reaction with the infective parasites, the tissues and the body fluids. The essence of the injection is that it is a *solution* or chemical combination from which the Antimonious Oxide is precipitated in a nascent condition ready for immediate reaction with the parasitic infection, and it is conceivable that all antimonials suffer a breakdown to Antimonious Oxide before they are assimilated.

Sir L. Rogers, L. i./19,505 gave Antimony Oxide in pill form in kala-azar relying on its solubility in the Hydrochloric Acid of the stomach but this is not satisfactory—small doses would not produce the necessary intensive action and large doses *per os* would cause violent vomiting by its direct action on the stomach lining. As to the 'solubility' we shook 5 Gm. in 500 Cc. of Physiological Acid and determined that the amount dissolved was exceedingly small.

Uses.—This preparation may permit of the use of bolder doses of Antimony Oxide in Glycerin combination, on the lines of the current treatment of trypanosomiasis and Bilharzia infection where 1 to 2 grain doses of Antimony Potassium Tartrate are commonly given.

Animal Experiments (1920) reported in our last Edition showed that intramuscular injection of a 2% preparation in pure glycerin was irritant due to acidity.

We neutralised the acidity as now shown and in addition we have altered the solvent to a 75% Glycerin in water. Fresh animal experiments (1924) indicated that the new injection injected undiluted under the skin of the back of a cat left a very tender swelling and caused suppuration later. The preparation *must* certainly *be diluted* at the time of use in man. The ordinary Injectio Antimonii Oxidi is tolerated and useful, and it is probable that an intermediate strength, *e.g.* 0·25% in glycerin and water will be tolerated. Note that Bassett-Smith gave a 0·36% solution without ill effect (page 173, first par.).

We hope that a preparation on these lines may prove of value in protozoal infections.

Injectio Antimonii Cinnamica.—Martindale.

Dose.—15 to 30 minims (**1 to 2 Cc.**).

Thirty minims contain Antimonious Oxide $\frac{1}{50}$ grain, with Sodium Cinnamate 1 grain in a mixture of Glycerin and Water, equal parts. Percentage parts—0·073 and 3·7 approx. respectively.

Hypodermic Sterules of all the above, both 15 and 30 minims in each, are prepared.

These preparations are employed in malignant disease by injecting into the mass of the tumour.

Elixir Antimonii Cinnamicum is intended for internal administration.

Dose.—1 to 2 drachms (**4 to 8 Cc.**).

Containing Antimonious Oxide $\frac{1}{10}$ grain, Glycerin Sodium Cinnamate 3 minims, Cinnamon Water to 2 drachms. Percentage parts : 0·092 and 2·5 approx. respectively.

Antimony and Opium, useful remedies in treatment of many chest affections.—*e.g.*, in bronchitis.—B.M.J. Apl. 18, 1908.

ℙ1 **Antimonium Tartaratum.** (*Off.*). *Syn.* Tartar Emetic. Antimony Potassium Tartrate. Fr. Cx. 'Emétique.'

ℙ1 "*And all preparations or admixtures containing* 1 *or more per cent. of emetic tartar.*"

$[K(SbO)C_4H_4O_6]_2,H_2O=664·721$.

Dose.—Diaphoretic $\frac{1}{25}$ to $\frac{1}{8}$ grain, emetic $\frac{1}{2}$ to 1 grain. *Intravenously* $\frac{1}{2}$ to 2 grains (**0·03 to 0·12 Gm.**), usually in 1 or 2% dilution. *Hypodermically* it is painful and irritant.

Fr. Cx. has *max. single dose* 3 grains ; max. in 24 hours 9 grains.

A single dose over limit of safety, *i.e.*, between 0·01 and 0·02 Gm. per kilo body weight, is sufficient to cause death. Can be given for indefinite period at intervals of three days, *provided dose is half the toxic in one.*—Fernand Michiels, per Jl. Trop. Med. Sept. 15/22,300.

Colourless crystals made by combining Antimonious Oxide with Acid Potassium Tartrate.

Soluble 1 in 17 of cold water. Almost insoluble in alcohol 90%. ***Incompatible*** with acids and alkalis, soap, and tannin.

Uses.—Diaphoretic and emetic.

In chorea in children this compound is less dangerous as emetic than apomorphine.

It is an active remedy in acute bronchitis.

Syphilis in man has been treated by Tartar Emetic intravenously in 1 in 1000 Solution made isotonic by using Normal Saline Solution. A daily dose for 11 to 12 days of 0·1 to 0·12 Gm. was given without causing inconvenience. Improved certain cutaneous manifestations, but the compound had no specific action on the progress of the disease—L.i./09,1080.

In SLEEPING SICKNESS, Tartar Emetic and **Antimonyl Sodium Tartrate** (*vide postea*) are given *intravenously*, as hypodermically they are too painful. The method alone (without Mercury or some other powerful adjuvant) is not effective, it drives the trypanosomes from the blood, but they still remain in the cerebro-spinal fluid.

Intravenously 1% solution in Normal Saline used in 2 to 10 Cc. doses daily for 5 to 10 days, then every other day or twice a week.

In espundia, granuloma inguinale, Kala-azar and oriental sore, tartar emetic has powerful action. Efficacious also in yaws (with other drugs) and beneficial in relapsing fever.

Castellani's Injection of Antimony Potassium Tartrate (*Intramuscular*).

Form No. 1.

Dose.—½ to 1 Cc. every other day in the gluteal regions.

Antimony Potassium Tartrate 8 grains, Carbolic Acid 10 minims, Glycerin 3 drachms, Water to 1 ounce.

Form No. 2 contains ½ grain Sodium Bicarbonate in addition.

Both these produce some pain a few hours after administration.

Mistura Antimonii et Potassii Iodidi (*Castellani*).

Dose.—One ounce diluted with 3 or 4 times the quantity of water thrice daily, for adults; ½ doses for children of 8–14 and for European patients.

Antimony Tartrate 1 grain, Potassium Iodide 1 drachm, Sodium Bicarbonate 15 grains, Sodium Salicylate 10 grains, Glycerin 2 drachms (or Syrup 1 drachm or Sodium Tartrate 10 grains), Water to 1 ounce.—A. Castellani, B.M.J. ii./16.552.

It is possible that on standing this mixture may deposit Antimonious Oxide, but a bottle of it which we prepared remained clear for a reasonable time. All the ingredients must be pure (the presence of Caustic Alkali will cause deposition) and each of the salts must be dissolved separately in a glass mortar *in as much water as possible before mixing.*

YAWS.—This mixture useful in conjunction with Novarsenobillon.—N. Cantlie, Jl. Trop. Med., Feb. 1/23,37.

CEREBRO-SPINAL FEVER benefited by ½ grain dose intravenously. A daily remitting temperature fell to normal in 60 hours and remained so.—S. Neave, L. i./16,1101.

KALA-AZAR well treated by Tartar Emetic injections intravenously. *Dose.*—Commence with 4 Cc. of 2% solution and gradually increase up to 10 Cc. Excellent results.—L. Rogers, L. ii./16,782. Except for melancholia and depression no toxic effects.—H. I. Winifred Kerr, L. ii./18,45.

Kala-azar treated in like manner starting with ¼ grain and rising with two or three days' interval to 2½ grains. Total given 64¾ grains. The case died of influenzal pneumonia and permitted examination of all the organs determining that complete sterilisation of the system had occurred so far as *L. Donovani* was concerned. Given in large doses over long period Antimony produces fatty changes in the liver and kidneys. The solution should not be too concentrated. Antimony Potassium Tartrate is evidently a specific against *L. Donovani*.—G. C. Low, B.M.J. i./19,702.

YAWS. No amelioration after Antimony Potassium Tartrate intravenously in 1 grain doses for 8 to 10 days.—F. T. Auden, B.M.J. ii./22,83.

MALARIA is not combated by Tartar Emetic.—J. Pratt-Johnson and co-workers. B.M.J. i./21,80. It was originally suggested by Sir L. Rogers. Numerous refs. in last Edn. p. 157,158.

Bilharziasis successfully treated by Tartar Emetic intravenously. For children ¼ grain, for adults ½ grain. A total of 30 grains or more is required lasting over 15 to 30 days. The dose is dissolved in 20 minims of distilled water and this diluted with 2 volumes of distilled water at time of use. It should be remembered that even small doses have been known to cause death (½ grain in a child and 2 grains in an adult. Care and judgment are necessary.—J. B. Christopherson, L. ii./18,325. See also B.M.J. ii./18,652.

Bilharziasis, seventy cases, treated by Antimony Potassium Tartrate at Khartoum Civil Hospital. A very complete treatise on Bilharzia infection in general. The solution used is ½ grain in 20 minims of distilled water diluted with an equal quantity of Normal Saline solution. It is thought to be the only drug with any direct effect on the disease. The dose (given every other day) is increased by ½ grain every injection until 2 or 2½ grains have been reached and this is maintained. (In the case of boys of 16 or under 1½ grains is the maximum). The total quantity injected would be 20 or 25 grains according to circumstances. If more than 25 grains is required, the surplus needed should be reserved for a second course. When the dose is 1½ or 2 grains (sometimes before), a cough immediately on injecting indicates that the Antimony is already in the pulmonary circulation and shows that the drug is both rapid and far reaching in its action. Two notable changes occur during the course of injections: disappearance of red blood from the urine but microscopic blood (smokiness) remains till later. The second change (after about 20 grains have been given) is that the urine apparently becomes clear and normal. These changes may coincide with the closing activities of the worm. Daily estimations of the Antimony eliminated during a course show that a third of the total amount of the Antimony given is eliminated. The cumulative action of Antimony may have been over-estimated by the older writers. Bilharzia infection in Egypt on physique and character is disastrous, the backward condition of the peasant (who constitutes 90% of the population) is attributable to this scourge.—J. B. Christopherson and J. B. Newlove —Journal of Tropical Medicine and Hygiene, July 15th, 1919, pp. 129–144.

Not only is the parasite *Schistosoma Hæmatobium* killed *in situ* by the method but later the embryos in the ova deposited in the terminal vessels are killed and the patient therefore ceases to be a carrier.

The Egyptian Fellaheen do not know they are infected. The parent worms, often many hundreds, are situated in the portal vein and its tributaries. The ova working their way from the venule to the surface of the bladder and rectum in order to escape with the urine or fæces may take months to do so. An ordinary uncomplicated case lasts 10 years or more. *S. Hæmatobium* lives for that length of time or longer. Hitherto it has been thought that "no direct or other means is known by which the parasite can be destroyed" (Manson, Trop. Dis., 1918). Christopherson holds there *is* a cure. After about 12 grains have been given in as many days *some* of the ova are shrunken, shrivelled, blackish, etc., and they do not later hatch out in water. When this point is reached the parent worm is held to be killed in the portal circulation and the ova sterilised *in situ*. The patient ceases to be a carrier after about 20 grains. The Antimony Injections should only be given with greatest caution when any important organs—kidneys, liver, heart, lungs, etc.—are not sound.—J. B. Christopherson, L. i./19,1021.

Bilharzial infection treated by Tartar Emetic—supports Christopherson's findings.—A. Innes, B.M.J. ii./19,340. Up to 2 grains intravenously as dose —J. G. Cawston, *ibid.* 380; see also Christopherson, *ibid.* 494, and F. E. Taylor, L. ii./19,246; Christopherson, *ibid.*, 299.

Japanese Bilharzia disease treated by Antimony Tartrate intravenously.—J. B. Christopherson, B.M.J. ii./21,551.

Bilharzia treated by Antimony Tartrate *per rectum.* As much as 100 grains given in all to a boy, by gradually increased dose, starting with 1 grain in 100 Cc. of water. Free from risk.—H. F. Wilson, B.M.J. i./22,137.

In bilharziasis and kala-azar it not only kills the trematode worm in the veins in the bladder and bowel, but it destroys eggs and their irritating and penetrating properties.—B.M.J. i./22,807.

1,000 cases of bilharziasis treated by Christopherson's method.—F. O. Lasbrey and R. B. Coleman, B.M.J. i./21,299. See also L. C. D. Hermitte, Jl. Trop. Med., April 15, 22,104.

Value in bilharzia, syphilis and leprosy.—F. Gordon-Cawston, M.P.C. Sept. 27/22,261. See also Pommé, Jl. Trop. Med. Jan. 15/23,33.

The presence or absence of bilharzia disease may be ***diagnosed*** by examining the blood serum on the lines of a Wasserman Test, the antigen used being made from the liver of snails infected with the cercariæ of schistosoma hæmatobium.—Murray, S.A.Med. Rec. May, 1920, p. 168. See also Fairley, L. i./19,1016.

RECTAL use for bilharziasis. First dose 1 grain, then 2 grains every second day, increasing to 3, 4 and 5 grains during 3 weeks. Less nausea and results equal to intravenous injections.—H. F. Wilson, B.M.J. i./22,137.

Rectal Bilharzia in 3 natives of Mongalla (C. Africa) completely cured by treatment with Antimony Tartrate.—N. Cantlie, Jl. Trop. Med., Feb. 1/23,40.

Further Notes on Treatment of Bilharziasis :—

The internal administration of the Liquid Extract of **Male Fern** 1 Gm. *t.d.*, "often acts like a charm" in controlling hæmorrhage.—Brooke. In the Zambesi district, the **Wortabel Treatment** with spirit of turpentine with thymol added.—L. ii./07,923. Avoid bathing too long in infected rivers and ponds. This is frequently a direct cause, the parasite entering through the urethra or anus. Bilharziasis is responsible in Egypt for most cases of moderate anæmia in children.—L. ii./11,1328. Bilharziasis and malignant disease of the bladder.—Jl. Path and Bact., July, 1911, p. 76.

Good results from **Thymo-benzene** (2 grains of Thymol on ½ drachm Benzene). Ova passed in shoals on the third day. The urine soon loses all colour of blood. Mild cases in robust subjects lose all trace of infection in a few weeks.—W. Robertson, L. i./16,698.

The intermediate host of the worm is a fresh-water mollusc. The two main species in Egypt have distinct intermediate hosts. Effective means found for rendering infected water safe in military camps.—B.M.J. i./17,832.

Emetine 3 grains given *intramuscularly* into the deltoid and lumbar regions every third day has been successful in bilharziasis: usually only 4 doses wanted. A child of 10 will stand 2½ grains.—B.M.J. i./21,586.

Account of personal experience of Bilharzia disease.—F. G. Cawston, Jl. Trop. Med., April 2/23,111.

American Leishmaniasis of the skin treated by Antimony Potassium Tartrate beginning with ½ grain, increased to 1 grain—six injections during 14 days. Then a second course starting with 1 grain and gradually increased to 2½ grains.—22 injections in this second course spread over ten weeks—total 47 grains of Antimony. Each dose was dissolved in 2 ounces of normal saline and sterilised. Cure.—G. C. Low, B.M.J. i./19,479.

Leishmaniasis of the skin is curable by a few grains (5 to 8) of Antimony Sodium Tartrate intravenously. For bilharziasis 20 to 30 grains are necessary. 60 grains or more are needed for Leishmaniasis or kala-azar and possibly more still for trypanosomiasis.—J. B. Christopherson, L. i./21,522. See also H. B. Day, *ibid.* 525, 545, and Christopherson, B.M.J.E. ii./23,21.

Antimony causes cutaneous lesions of leishmaniasis to vanish, while Arsenic has no effect; it also heals syphilitic lesions due to Leucocytozoon syphilidis which are resistant to any other treatment. Tartar Emetic best administered *intravenously.*—J. E. R. McDonagh, Jl. Trop. Med., April 16/23,119.

Cutaneous leishmaniasis in Brazil. Two rare cases described. One cured by Tartar Emetic and the other well treated by Di-Sodo-Luargol.—De Aguiar Pupo, per Jl. Trop. Med., June 1/23,201.

Dermal leishmaniasis is a very widespread disease among the gum gatherers in Mexico, thought to be transmitted by a flying insect, which frequents the

forests. Tartar Emetic intravenously recommended as the best form of treatment.—A. Inchaustegui, per Jl. Trop. Med., June 1/23,198.

Keratitis well treated by Tartar Emetic intravenously.—F. G. Cawston, Jl. Trop. Med., May 15/22,127.

GRANULOMA INGUINALE—a disease endemic in Louisiana. Tartar Emetic intravenously specific.—I. M. Gage, per Jl. Trop. Med., June 15/23,222.

℗ **Sterules of Antimony Potassium Tartrate,** ½ grain (0·03 Gm.) 1 grain (0·06 Gm.), and 2 grains (0·12 Gm.) in 1·5 Cc. (25 minims), 3 Cc. (45 minims) and 6 Cc. (90 minims), i.e. 2% solutions, are made.

℗ **Solubes of Antimony Potassium Tartrate** contain 10 grains (0·6 Gm.) with Sodium Chloride 6 grains (0·4 Gm.), on the same lines as those of Antimony Sodium Tartrate, *q.v.*

Pulvis Antimonialis. (*Off.*) JAMES'S POWDER.

Dose.—3 to 6 grains (0·2 to 0·4 Gm.).

Contains 33⅓% Antimonious Oxide.

℗ **Pilula Antimonii Conii et Quininæ.**

Dose.—As required in fever.

James's Powder 1 grain, Conium Extract 2 grains, Quinine Sulphate 2 grains. A pill on the lines of this formula had a reputation in Italy for treatmcnt of malarial fevers. A most successful pill used in a variety of febrile conditions.—Drage.

℗ **Vinum Antimoniale** (*Off.*)

Note. ℗ *Preparations or admixtures containing Antimonial Wine.*

Dose.—10 to 30 minims (0·6 to 2 Cc.); as emetic 2 to 4 drachms (8 to 15 Cc.); contains 1 in 250 by volume.

Flavoring.—It has little taste when diluted.

Pharmacological action of Antimony in treatment of bronchitis. The dry membranes become flooded with healing serum.—*cf.* Emetine and Potassium Iodide.—P.R.S.M. Therap. Sect. 1911, p. 41.

Pneumonia is well treated by repeated 2½ minim doses of Antimonial Wine. Crisis comes at the end of the fourth day.

Antimonii et Sodii Tartras. Antimonyl Sodium Tartrate. $[Na(SbO)C_4H_4O_6]_2H_2O$=632·520. (*It is not a Poison within the meaning of the Act.*)

Dose.—*Per os,* presumably on the lines of Tartaric Emetic.

Intravenously, ½ to 2 grains (0·03 to 0·12 Gm.) usually in 1 or 2% dilution.

Hypodermically it is not advised.

Manufacture.—Boil Antimonious Oxide 10 in a solution of Sodium Acid Tartrate 13 until almost clear (the quantity of Antimonious Oxide is purposely in slight excess). Filter and evaporate to dryness. When dried at 105° C. the substance retains ½ H_2O. Plimmer has shown that by adding alcohol to the concentrated solution the compound crystallises out with 2½ H_2O. There is no great advantage in this method. Furthermore, we have found that much of it remains in the mother liquor. The body is a white crystalline powder. ***Solubility*** 1 in 1½ of water.

Uses.—This compound has properties similar to Tartar Emetic.

Its greater solubility may be of some advantage. It is stated to have the lowest degree of toxicity of the Antimonials for intravenous injection—Chopra and Napier, I. Med. Gaz. Jan. 1923. It has been largely used in bilharzia infection, in which it is effectual. Kala-azar has been treated with it, and quite recently success with it has been claimed in syphilis.

It has also been tried in trypanosomiasis.

Sterules of Antimony Sodium Tartrate.—½ grain (**0·03 Gm.**), 1 grain (**0·06 Gm.**), and 2 grains (**0·12 Gm.**) in **1·5 Cc.** (25 minims), **3 Cc.** (45 minims) and **6 Cc.** (90 minims) respectively, i.e. 2% solutions, are made.

Antimony Sodium Tartrate Solubes 10 grains (**0·6 Gm.**), combined with Sodium Chloride (**0·4 Gm.**). These, on dissolving in 40 Cc. of distilled water and boiling produce a solution ready for injection. 2 Cc. contain ½ grain (**0·03 Gm.**). They are convenient for carrying in the Tropics by medical men having occasion to give a number of injections.

KALA-AZAR well treated with Antimonyl Sodium Tartrate intravenously. Begin with small dose, 0·5 Cc. of 2%, increasing by 0·5 Cc. up to a maximum of 5 Cc., and continue for from 2 to 4 months as required. Heart, kidneys and lungs must functionate well.—R. N. Chopra and L. E. Napier, Ind. Med. Gaz. Jan. 1923, per B.M.J.E. i./23,45. Jl. Trop. Med. Mar. 1/22,64.

ORIENTAL SORE. The best treatment is Sodium Antimony Tartrate, 5 to 10 Cc. of 1% solution daily, or less often, until healed. Vaccine and dressing with Salol in Olive Oil.—A. W. Sheen, Pr. Feb. 21, p. 85. See also J. B. Christopherson, Jl. Trop. Med. June 1/23,205. Oriental sore in Russian Turkestan—where it is very prevalent—successfully treated with 2% solution intravenously.—Maj. J. A. Sinton, per Jl. Trop. Med., June 1/23,200.

FILARIASIS is not cured by Antimony Tartrate intravenously.—G. C. Low, L. i./21,221. (Sir L. Rogers tried Antimony Sodium Tartrate).

LEPROSY. Beneficial results with Colloidal Antimony. Improvement also noted with intravenous injections of 2% solution of Tartar Emetic.—F. G. Cawston, per T. D. B., Vol. 17/21,284.

GRANULOMA PUDENDI well treated with Tartrated Antimony. Salvarsan useless.—D. J. Maxwell, Jl. Trop. Med., July 2/23,235.

LEISHMANIASIS OF THE SKIN has been treated with this and Tartar Emetic *q.v.*

SYPHILIS treated with Antimony Sodium (and Potassium) Tartrate intravenously. Initial dose ½ grain, gradually increased to 1½ or 2 grains—given in 3 Cc. of water. Total dosage varied—in one case 23 grains. Results not inferior to those with Arsenic.—F. G. Cawston, B.M.J. i./22,266.

In tuberculous disease of the lungs and of the eye Tartar Emetic (intravenously) deserves further trial.—F. G. Cawston, B.M.J. i./24,820.

CAUTION.—*One-third of the amount of Antimony injected is excreted by the kidneys in 24 hours. Great caution required where heart kidney or lung disease exists. In weak, emaciated and anæmic subjects begin with small dose gradually increased.—R. N. Chopra, per Jl. Trop. Med., April* 16,/23,133.

Antimony Salts are not so powerful in syphilis as the Arsenic Compounds. The reason why Spirochætes vanish so quickly after Salvarsan is that they contain free OH groups, since in their colloidal lipoid membrane an unsaturated fatty acid exists. (Presumably a free acid, *i.e.*, with a Carboxyl OH —not "unsaturated," as usually understood.—W. H. M.) It is to these OH groups that the metals become attached, with the result that the organisms perish. The other phases (*cf.* syphilis, Vol. II. for ? existence of a life cycle) of the Leucocytozoon Spyhilidis have no free OH group—they are probably destroyed by enzymes helped by Arsenic or Antimony.—J. E. R. McDonagh, B.M.J. ii./13,1512.

Trypanosomiasis.—In the experimental treatment in rats a number of drugs were tried including this compound. A rat, whose blood was teeming with trypanosomes, after 0·35 Cc. of a 1% solution of this drug showed complete disappearance of typanosomes from the blood in half an hour.—Ninth Report of the Sleeping Sickness Commission of the Royal Society.

0·5 Cc. of 1% solution per Gm. weight of rat is considered maximum dose. Its quickness of action is remarkable. A few very persistent forms can still be found in the liver. They need to be tired out by successive doses. —Plimmer and Thomson, Roy. Soc. Na. Jan. 9/08,238. L. i./09,778.

Experiments to determine the resistance of the trypanosome of sleeping sickness to Antimony, Arsenic and Bismuth showed that of each 1 in 200,000 was sufficient to banish the parasite. 1 mgr. of Antimony destroyed the parasites in a 200 Gm. rat. Arsenic acted more slowly and in the case of Bismuth the damage done to the host was generally irreparable. *The trypanosomes, however, not permanently destroyed—they return in course of time*, and ultimately antimony and arsenic-resistant trypanosomes are produced and retaining this property can be propagated from rat to rat—the arsenic resistant trypanosomes are still susceptible to Antimony and Bismuth. Suggestion to treat patients with all three drugs at once.—Cushny, L. i./09,239.

Sleeping sickness treated with Antimony and Atoxyl showed promising results.—Report by J. A. Clark, per T.D.B. Vol. 17/21,322.

The revival of the use of Antimony is a triumph of rational therapeutics, for it was through reasoning from its chemical affinities that Cushny and Plimmer were led to try the remedy in diseases dependent on protozoal parasites. *The control of trypanosomes by Antimony* and Arsenic given together and in alternation is as striking as the cure of malaria by Quinine. Antimony in the form of Antiluetin (Antimony Ammonium Potassium Tartrate) has been tried in syphilis with good results.—L.i./17,307.

Intravenous Injection of Antimony Sodium Tartrate 1/6 grain in Normal Saline has been reported effectual up to a point. 13 injections given with intervals of about 4 days or more. On the thirteenth injection, however, severe symptoms supervened,—chill and violent abdominal pain, and later intense headache, temperature 103·6,—this lasted 5 to 6 hours. The treatment however, reduced the trypanosome fevers and apparently freed the peripheral blood from trypanosomes,—and no recurrence during 1½ years. —B.M.J. ii./11,104.

Antimony is a more powerful trypanocide than arsenic, but the elimination of the antimony is rapid, so the injection of the **Metal** itself, in fine division was tried. This is taken up by the leucocytes, and gradually changed into some soluble compound, and it was thought that it might be carried to parts of the body not easily accessible to other methods of administration. It acts much more slowly than the salts, and takes from two to three times as long to clear the peripheral circulation of trypanosomes as subcutaneous injection of a salt does. But the excretion is slower, so that the blood and organs are in much longer contact with antimony than when a salt is administered. If carefully administered no irritation of the tissues is produced and the vessel walls are not affected. Animals appear to be more susceptible to overdosage than with the salts, and it is curious that an animal with trypanosomes in the blood can bear well a dose which is fatal to a healthy animal. —From the work of Fry, Rankin and others.

Intramuscular Injection of precipitated Antimony in trypanosomiasis. *Dose* of 10 minims=½ grain of Antimony in Lambkin's oily medium, *i.e.*, 5% suspension, was followed immediately

by severe local pain. Symptoms lasted two weeks. Morphine had to be freely used. Patient was, however, then able to walk.

Unguentum Antimonii. We have made this ointment containing 5% and upwards of finely powdered Metallic Antimony in a basis of Lanolin Ointment for use in skin affections.

✱**Stibenyl** (T.M. 406221). *Syn.* SODIUM ACETYL-*p*-AMINOPHENYL-STIBINATE.

Dose.—0·05 to 0·1 Gm. (¾ to 1½ grains) intravenously in 30 Cc. of Distilled water (?).

The compound—it is the antimony analogue of Sodium Acetyl-Arsanilate (Arsacetin)—occurs in brownish powder, easily soluble in water. A communication dealt with its use in trypanosomiasis and in Kala-azar.—P. Manson-Bahr, L. ii./20,178.

Efficacy in trypanosomiasis and bilharziasis questioned.—B.M.J. i./21,650.

Should be used in smaller doses than originally advised, commencing with 0·05 and 0·1 Gm. intravenously.—P. Manson-Bahr, L. i./21,991.

Not successful in Kala-azar—2 cases died in "disastrous" circumstances—L. E. Napier, L. i./23,280. A case cured. Doses varied from 0·05 to 0·2 Gm.—Monier-Vinard, J. Renault and G. Gendron, per Jl. Trop. Med., Aug. 1/*23,257.

TRIPHENYL ANTIMONII SULPHIDUM. $(C_6H_5)_3SbS = 383{\cdot}48$.

A white crystalline powder. Tasteless, odourless and insoluble in water or alkali, easily soluble in Chloroform, only slightly in Alcohol and Ether.

A 10% solution is made in Olive Oil with a little petroleum ether, also 5 to 10% ointment.

For skin affections, especially alopecia. Liberates sulphur in *statu nascendi*.

Linctus Expectorans.

Dose.—½ to 1 drachm (**2 to 4 Cc.**). Sulfidi Stibici (Antimonii Sulphurati) 2, Syrupi 450, Aquæ Amygdalæ Amaræ 50. To be shaken before administering. Said to be of value for cough Ph. Notes.—Denmark

Antimony Crocus.—For veterinary use, is a mixture of Tri-oxide (about ⅔) and Tri-sulphide (⅓) Formed by heating equal weights of Antimony Tri-sulphide and Potassium Nitrate to which ½ of Hydrochloric Acid has been added.—U.S.D.

For further Organic Antimony Compounds, see Vol. II.

APIOL.

Dose.—3 to 6 minims (**0·2 to 0·4 Cc.**), in **Perles**, 3 minims in each, or **Capsules** 3, 5, and 10 minims.

A liquid preparation obtained from, and containing the active properties of, the fruit of *Apium Petroselinum. Syn. Petroselinum sativum*, common parsley. It is usually a transparent green fluid, but is also met with as a dark oily liquid, with a peculiar odour and a pungent taste like parsley. Soluble readily in alcohol and ether.

It has decided efficacy in primary amenorrhœa or deficiency of secretion, as well as in accidental suppression and in dysmenorrhœa. Should be given night and morning for 4 or 5 days during the time.

Parsley contains no alkaloid; *cf. Æthusa Cynapium.*

Apiol, Crystallised. **'White Apiol.'** ÉTHER MÉTHYLÉNIQUE ET DIMÉTHYLIQUE DE L'ALLYL-APIONOL. CAMPHRE DE PERSIL. (Was in Fr. Cx. Now removed by Fr. Cx. 1920.)

$$CH_2:O_2:C_6H(OCH_3)_2CH_2.CH.:CH_2 = 222{\cdot}172.$$

In acicular crystals. For amenorrhœa a sterilised solution in olive oil containing 3 grains (**0·2 Gm.**) in 15 minims (**1 Cc.**) has been given—injected once daily for some days before the period. Also given as a quinine substitute in malaria.

℗ **Capsules of Apiol and Ergotin.**
Contain Apiol 5 minims (**0·3 Cc.**) and Ergotin 2 grains (**0·12 Gm.**).

℗ **Ergoapiol.** Under this name capsules are supplied for amenorrhœa, dysmenorrhœa and allied disorders.

Gall Stones treated by infusion of parsley—a double handful of fresh parsley leaves soaked in cold water, which was afterwards brought to the boil, strained and allowed to cool. *Dose*: 1½ pints daily. Obviated operation for years.—H. C. Kidd, B.M.J. ii./20,244.

Apium graveolens. (*Umbelliferæ*) ACHE DES MARAIS.—FR. CX. Celery. The entire herb is used in 'SIROP DES CINQ RACINES.'

Oil of Celery. *Dose.*—½ to 3 minims or more. Contains a small proportion of Apiol. Antispasmodic and nerve stimulant.

In rheumatoid arthritis 5 to 15 minim doses have been used successfully. It acts probably as an intestinal antiseptic.

APOCYNUM, U.S. VIII.

American Indian Hemp Root. *Syn.* APOCYNUM CANNABINUM. CANADIAN HEMP.

Average dose (of root in powder) 15 grains (**1 Gm.**).

Does not contain Alkaloid and is not in Poisons Schedule, but caution: a powerful drug.

Pharmacology.

The tincture (10%) is about 1½ times more toxic than Tinctures of Digitalis and Squill, and nearly six times less toxic than the Tincture of Strophanthus. Produces its diuretic effect best on patients with cardiac disease and a failing heart. Ranks next to Strophanthus as regards toxicity to frog's heart and it is more toxic than digitalis and squill. No special difference in action on the kidneys, but apocynum is most likely to produce hæmaturia owing to its irritant properties.—L. i./10,81.

Uses.—Stated to be a rapid and efficient cardiac stimulant, also an active diuretic occupying a place between Digitalis and Caffeine, non-cumulative. A powerful emetic, diaphoretic, cathartic, and anthelmintic, and diuretic, employed in cardiac dropsy and Bright's disease. The active principle is said to be a crystalline non-glucosidal substance called variously **Cynotoxin** and **Apocynamarin.**

Tinctura Apocyni. 1 in 10 of Alcohol 60 %.

Dose.—5 to 60 minims (**0·3 to 4 Cc.**).

Uræmia is warded off by the profuse diuresis it produces and it is valuable in removing pleuritic effusion. **Decoctum** 1 in 60. *Dose.*—½ to 1 ounce.

Fluidextractum Apocyni, U.S. VIII.

Average dose.—15 minims (1 Cc.). 1=1 glycero-hydro-alcoholic. Useful in dilatation of heart, mitral, and other valvular lesions.

℗ APOMORPHINÆ HYDROCHLORIDUM.

℗ *Apomorphine and its Salts.*

℗ **Apomorphine Hydrochloride** (*Off.*) U.S., P. HELV., P. JAP. Chloretum Apomorphicum, P. DAN.

For details of the Chemical Formula of this body, see Vol. II.

Dose.—$\frac{1}{32}$ to $\frac{1}{16}$ grain (**0·002 to 0·004 Gm.**), increased, as an

expectorant (not official); $\frac{1}{10}$ to $\frac{1}{4}$ grain (**0·006 to 0·016 Gm.**) as an *emetic per os*; $\frac{1}{20}$ to $\frac{1}{10}$ grain (**0·003 to 0·006 Gm.**) as *emetic hypodermically.*

In all cases of poisoning it is of great value as an emetic.

A derivative of morphine or codeine obtained by heating them with an excess of hydrochloric acid in sealed tubes. Apomorphine is morphine deprived of a molecule of water. In commerce the hydrochloride occurs in minute pale greyish white, acicular crystals.

Soluble.—1 in 60 of water, 1 in 5 of alcohol 90 %; the solution turns emerald-green in colour, but some state that this causes little loss of medicinal power. This discoloration is said to be due to the action of free ammonia in the air. For method of making colourless injection *vide infra.* Insoluble in ether and chloroform.

Incompatible with sodium carbonate and bicarbonate, tannin and iron salts.

Uses.—It acts as a non-irritant emetic and anti-stimulant; in bronchial asthma doses of $\frac{1}{6}$ grain are very useful. Small doses are expectorant and relieve bronchitis and pertussis. May be given as—

℗**Tabellæ Apomorphinæ,** $\frac{1}{100}$ grain (**0·0006 Gm.**) and $\frac{1}{50}$ grain (**0·0013 Gm.**) in each, with chocolate, also ℗**Tablets Compressed.**

℗**Injectio Apomorphinæ Hypodermica.** (*Off.*).

Apomorphine Hydrochloride 1, Diluted Hydrochloric Acid 1, Distilled Water to 100. $\frac{1}{10}$ grain in 11 minims.

Dose.—5 to 10 minims (or more) as an emetic. The addition of the trace of acid keeps it stable and colourless.

This injection is hypotonic. It requires 0·055 Gm. NaCl or 0·3 Gm. Glucose added to each 10 Cc. to make it isotonic.

The following will also remain colourless:—Shake Apomorphine Hydrochloride 1, with Alcohol 90% 50—add Water 140 and finally Diluted Hydrochloric Acid 10.—Pharm. Zeitung 61,640. We found this on trial very satisfactory—the solution remained colourless for weeks.

The effect produced by a small injection on a mad-drunk patient is remarkable. As hypnotic $\frac{1}{40}$ to $\frac{1}{20}$ grain. The patient, however wild, sleeps 10 to 12 hours and awakes refreshed.—B.M.J. ii./13, 663.

In puerperal convulsions it soon causes vomiting and free perspiration, patient sleeps and awakes quiet.

In a case of obstruction of the œsophagus by a plumstone, the injection of Apomorphine hypodermically caused vomiting and its removal.

℗**Hypodermic Tablets** are prepared containing $\frac{1}{20}$, $\frac{1}{15}$ and $\frac{1}{10}$ grain in each. ℗**'Sterules' Hypodermic** contain $\frac{1}{10}$ grain.

℗**Syrupus Apomorphinæ (Hydrochloridi), B.P.C.**

Apomorphine Hydrochloride 0·05, Diluted Hydrochloric Acid 0·25, Alcohol (90%) 4·5, Distilled Water 4·5, Syrup to 100.

Dose.—$\frac{1}{2}$ to 1 drachm (**2 to 4 Cc.**), contains $\frac{1}{30}$ grain Apomorphine Hydrochloride in 1 drachm.

As an expectorant $\frac{1}{20}$ grain every 2 hours is useful, or, given with the same quantity of morphine every 2 or 4 hours, it lessens cough and increases fluidity of sputa.

Ⓟ Linctus Apomorphinæ cum Codeina.

Dose.—1 drachm (4 Cc.).

Apomorphine $\frac{1}{50}$ grain, Codeine Phosphate $\frac{1}{12}$ grain, Dilute Hydrocyanic Acid 2 minims, Syrup of Virginian Prune 1 drachm.

A useful expectorant.

Ⓟ Mistura Apomorphinæ Composita, *Luff.* (*Syn.* **Mistura Tussis,** *Luff.*)

Dose.—Half ounce every four hours.

Apomorphine Hydrochloride 1/48 grain, Morphine Hydrochloride 1/24 grain, Heroin Hydrochloride 1/24 grain, Dilute Hydrochloric Acid 5 minims, Syrup of Virginian Prune ½ drachm, Chloroform Water to ½ ounce.

A palatable mixture useful for irritable cough, especially post-influenzal cough. The hydrochloric acid effectually prevents the precipitation of any of the alkaloids.—A. P. Luff, B.M.J. i./14,635.

AQUÆ CONCENTRATÆ.

These are made commercially about 40 times as strong as the distilled Aromatic Waters by dissolving the requisite amount of Essential Oils in Spirit of 70% strength (by volume). They are diluted 1 up to 40 at the time of use and have the advantage of keeping good any length of time in any climate. The following is a list, giving the proportions of Essential Oil (or ingredient stated) to prepare 100 parts of concentrated water :—

Aqua	Amygdalæ Amaræ Concentrata U.S	4·0 (use Essential Oil *with* HCN)
,,	Anethi Concentrata	8·0
,,	Anisi Concentrata	8·0
,,	Aurantii Floris Concentrata	8·0
,,	Camphoræ Concentrata	4·0 (Camphor)
,,	Carui Concentrata	8·0
,,	Cassiæ Concentrata	8·0
,,	Chloroformi Concentrata	10·0
,,	Cinnamomi Concentrata	8·0
,,	Foeniculi Concentrata	8·0
,,	Menthæ Piperitæ Concentrata	8·0
,,	Menthæ Viridis Concentrata	8·0
,,	Pimentæ Concentrata	5·0
,,	Rosæ Concentrata	1 to 2
,,	Sambuci Concentrata	1

These strengths have been calculated in some instances from the average yield of oils from the drugs in question, and in others from the strengths of the extemporaneous Aromatic Waters (*Off.*), allowed for use in the Colonies, qualified by the fact that the general solubility of Essential Oils in water is about 1 in 500. The solubility would not be materially greater in the weak spirit of the finished product. We have prepared all from the above formulæ and find same satisfactory. Terpeneless and Sesquiterpeneless Oils may be used as being more soluble.

ARGENTUM.

Ag=107·88.

Argenti Acetas. $CH_3COO\ Ag$=166·914.

In white crystals, ***soluble*** in water. A 1% solution for purulent ophthalmia in infants. Dilute Sodium Chloride Lotion may be used after it.

ℙ1 **Argenti Cyanidum, U.S. VIII.** AgCN=133·895.

Dose.—$\frac{1}{64}$ to $\frac{1}{20}$ grain (**0·001 to 0·003 Gm.**). (U.S. gives no dose.)

White powder containing 80·48% Ag. Used for producing extemporaneously Acidum Hydrocyanicum Dilutum (U.S.) by treatment with dilute Hydrochloric Acid. Antipyretic occasionally used in epilepsy and chorea.

ℙ1 **Pilula Argenti Cyanidi** contains $\frac{1}{60}$ grain.

Argenti Iodidum Recens. Ag I=234·80.

In the freshly precipitated form this salt has been used in cases of ophthalmia. It has useful astringent properties stated to be almost as good as adrenalin.

Also advocated in emulsion for use in urethritis and other similar conditions The nascent silver iodide in 3% suspension may be produced from silver nitrate 2·2 Gm., potassium iodide 2·2 Gm., distilled water 50 Cc., mucilage of Irish moss N.F. to 100 Cc. The degree of fineness of the precipitate is photographically of importance, so also by analogy therapeutically. To produce a coarse precipitate the salts are separately dissolved in 5 Cc. of the water, shaken and diluted with the mucilage. For a light flocculent precipitate dissolve each in 50 Cc. of water. Gelatin 0·3% has also been used to dissolve the Potassium Iodide.

For the cure of corneal opacities and conjunctivitis, this suspension, commencing with 1% strength is most serviceable, also satisfactory in treatment of pannus. In ulcer of the cornea it should be used cautiously. For gonorrhœal ophthalmia most efficacious. One drop of weak solution instilled three times a day or oftener in cases of extensive chemosis and danger of corneal sloughing, alters the condition in a few days.—P. Maloney, Clin. Jl., Oct. 13, 15.

Neo-protosil.—A colloidal protein-Silver Iodide compound, containing about 20% of Silver Iodide in cream coloured scales, readily soluble in water, but when making a solution the container should be briskly shaken for a minute to prevent scales adhering together. The solution is bland and equal in bactericidal effect to Colloidal Silver Solution and non-staining. Used in urethritis, inflamed conditions of the eye, ear, nose and bladder, etc.—L. ii./22,298.

Neoprotosil Capsules.—One dissolved in 2 drachms of water forms a 5% solution.

Argentide. A concentrated Solution of Silver Iodide, containing 100 grains in each ounce. A small quantity added to water causes a precipitation of pure silver iodide in fine suspension for antiseptic treatment of cystitis, gonorrhœa and conjunctivitis.

Argenti Nitras. $AgNO_3$=169·88. *Syn.* Lunar Caustic.

Dose.—$\frac{1}{4}$ to $\frac{1}{2}$ grain (**0·016 to 0·03 Gm.**) in a pill, best with kaolin ointment as an excipient.

Incompatible with organic material, *e.g.*, rose water, if used instead of distilled water for preparing a lotion of pigment; also with Tartaric Acid, Hydrocyanic Acid, Iodine, Potassium Iodide and Bromide.

Soluble 1 in 0·53 of water and 1 in 20 of alcohol 90%.

Dangerous Mixtures are produced with certain conditions—*e.g.*, when a small quantity of powdered Silver Nitrate, *e.g.*, 2 to 3 Gm. is mixed with an equal quantity of powdered Magnesium and then a drop of water added, a slight explosion with vivid flash occurs.—Na. Nov. 9/11,42.

Uses.—Much employed as a caustic and stimulant to promote healing. Small doses internally check diarrhœa of children. In typhoid has been used where there is hæmorrhage $\frac{1}{6}$ grain every 3, 4 or 6 hours, or even as often as every 2 hours. Rectal injections are also useful for the bleeding of dysentery (60 grains in 3 pints). In laryngeal phthisis a spray $\frac{1}{4}$ to 2 grains to the ounce.

In vomiting of pregnancy $\frac{1}{6}$ grain in a wine-glass of water every 6 hours has been found effective. In gastric ulcer $\frac{1}{3}$ grain in a pill 3 or 4 times daily half an hour before food useful. Solutions have also been used. In eczema of the flexures and particularly of mucous surfaces, Solution 2 to 3%, alternating with Lotio Calaminæ Oleosa is valuable. Pigments, 2 to 5% are used for the throat, and applied to ulcers as a stimulant. Lotions and eye-drops vary from 1 in 1,000 to 1 in 100. Purulent ophthalmia is treated with 1 to 2% drops. Ulcerative stomatitis is well treated by 0·5 to 2% Solution.

Glycerin 15% added to $\frac{1}{2}$ to 2% silver nitrate solution renders it less painful, and possibly more effective.

Silver Nitrate is on the alert to react (*e.g.*, precipitate with soluble chloride) in such manner that its electrical state and stability of its ions are altered—herein lies its nature.—Burdon Cooper.

War wounds have been treated by spraying with very dilute Solutions—see **Wounds**, Therap. Index.

Urethral and Vaginal Injections 0·02 to 0·2% (1 in 5,000 to 1 in 500) usually employed.

In lavage of the entire urethra 2 grains to the pint (1 in 5,000 approx.) is sufficiently strong. Hydrostatic pressure may be used, *i.e.*, the container being about 5 feet above the couch, instead of a syringe.

Cystitis: Diagnosis and treatment. Against Urotropine there are innumerable failures. Ideal urinary antiseptic not found. With regard to lavage, Silver Nitrate best. A weak solution, 1 in 20,000 first, gradually increased. Eusol as accessory to supra-pubic drainage; rarely with catheter—too painful. Vaccines useless.—J. F. Dobson, B.M.J. ii./21,305.

Epithelial tumours of the urinary bladder. The old-fashioned Silver Nitrate washes still hold the field. A patient had the bladder washed out over 2,000 times. Diathermy more rapid.—F. Kidd, L. i./23,582.

Whooping cough treated by painting the throat every two days with 2% Silver Nitrate Solution—success attributed to suggestion rather than bactericidal action.—L. i./21,1312.

Creeping disease (*Pseudo-myiasis*), a suspected case of, successfully treated with Nitrate of Silver.—A. Gambier, per Jl. Trop. Med., April 16/23,133.

Antidote to Silver Nitrate.—Common salt, given in some demulcent drink (excess should be avoided as it is very irritant to the stomach). Salt is also used to arrest its action locally as a caustic. The pain caused by application of solutions of silver nitrate may be alleviated by previous application of a solution of cocaine nitrate.

Argyria produced. Inside of nose repeatedly painted for 18 months, and after an interval of a year nose and throat painted practically daily. Prolonged use dangerous.—per Clin. Jl. Jan. 3/23,6.

Stains caused by Silver Nitrate are best removed by Potassium Cyanide.

Liquor Argenti Nitratis, R.O.H.—1 or 2%.

Soluté d'Azotate d'Argent au Cinquantième. *Syn.* **Solution Préventive contre l'Ophtalmie des Nouveau-nés. Fr. Cx.**

Supp. 1920. Contains 2% with an official form of direction. One drop into each eye as soon as possible after birth.

In ulcerative blepharitis 1 or 2% solution a sovereign remedy; Protargol 10% or Argyrol 20% may be employed.—R. A. Greeves, L.ii./23,997.

Urethral Bougies of Silver Nitrate contain ½ grain with Theobroma basis. Give good results in obstinate cases of gonorrhœa.

Argenti Nitras Fusus. **U.S.** Contains 94·5% of Silver Nitrate. Silver Nitrate 100 Gm., Hydrochloric Acid 4 Gm. Melt at low temperature and pour into suitable moulds.

Argenti Nitras Mitigatus (*Off.*). *Syn.* MITIGATED CAUSTIC. Silver Nitrate 1, Potassium Nitrate 2, fused together and moulded into sticks for use as caustic.—P. Jap. uses equal parts.

Argenti Nitras Induratus, Toughened Caustic (*Off.*). Contains 5% of potassium nitrate moulded into caustic points.

For the use of Silver Nitrate in preparation of Hair Dyes, see Vol. II.

Ophthalmic Lamels of Silver Nitrate contain $\frac{1}{500}$ grain in each combined with gelatin.

Pigmentum Argenti Nitratis Æthereum, L.H.

Silver Nitrate 20 grains, Distilled Water 1 drachm, Spirit of Nitrous Ether to 1 ounce. Caustic even when painted on a greasy skin. 3 to 10 grains to the ounce relieves pruritus ani and pruritus vulvæ.

℞ ℙ **Pilula Argenti Nitratis et Morphinæ Acetatis, Crocq's Pill** contains ⅙ grain of each salt made with Kaolin Ointment.

Argenti Oxidum. B.P. '98. Ag_2O=231·76.

Dose.—½ to 2 grains in a pill with kaolin ointment.

Is not so caustic in action as silver nitrate. Continued administration may discolour the skin. It readily yields its oxygen, and will explode (if mixed) with such bodies as phenol and creosote.

Uses.—Has been given in epilepsy, chorea, and dysentery. It stains the skin less than the nitrate.

Argenti Fluoridum. *Syn.* TACHIOL (soluble 1 in 2), ARGENTI CITRAS. *Syn.* ITROL (hardly soluble), and **Argenti Lactas,** *Syn.* ✱ ACTOL, (T.M, 192493) are occasionally used by urethral injection, strength 1 in 5,000 upwards, in gonorrhœa.

Argyrol.—*Syn.* VITELLIN.

A vegetable protein compound containing about 30% of silver.

Soluble in water in all proportions—solutions keep well. ***Incompatible*** with Cocaine Hydrochloride and other alkaloids. In purulent conjunctivitis (gonorrhœal, neonatorum, etc.), free instillation of 25% solution every 3 or 4 hours; catarrhal conjunctivitis, 5 to 20% one or more times daily trachoma, 25% solution rubbed with force on wool into lids once daily dacryocystitis, corneal ulcers, etc., 25% solution.

Numerous critical views as to its efficacy have been published.

Ulcerative colitis has been treated by washing out with 1½ pints of 1 % Argyrol solution at 80° F.

Unguentum Argyrol 2% with paraffin basis in eczematous conjunctivitis and keratitis. **R.O.H.** has 20%.

Suppositories containing 1 to 4 grains have been used.

✱**Collargolum** (T.M. 219555) **Colloid Silver.**—*Syn.* ARGENTUM COLLOIDALE, P. Jap. IV., ARGENTUM CRÉDÉ.

Dose.—½ to 2 grains (**0·03** to **0·12 Gm.**) in pills or solution.

ARGENT COLLOIDAL (COLLARGOL). FR. CX. SUPP. II. Contains at least 70% Silver in combination with albuminoid substances. Soluble slowly 1 in 25 in cold water. The precipitate obtained on adding saturated solution of Sodium Chloride re-dissolves on further addition of water.

Collargol Tablets contain ¾ grain (**0·05 Gm.**).

Black scales, miscible in all proportions with water, but does not form a clear solution even when dilute.

Internally has been used for gastric and intestinal catarrh; also *intravenous* injections of a ½ to 1% solution for septic affections such as endocarditis, also in difficult labours where septic complications feared. 0·1 to 0·15 Gm. in 1% solution as a dose.

Hair is stated to grow on the parts as result of subcutaneous injections of 5 to 10 Cc. of 1—2% solutions combined with 2% egg albumin solution and 1% eucain solution, in treatment of leprosy.

For ophthalmic use 1 to 10% solutions are employed.

Diphtheritic membrane is said to disappear under swabbing with 5% solution.

In urinary diseases Collargol injections for diagnosis introduced by catheter —B.M.J ii./13,918.

Subacute bacterial endocarditis. Intravenous injections of Collargol and other metallic and antiseptic substances tried—no success.—B. Parsons-Smith, B.M.J. i./21,43.

Suppositories of Collargol 2½ grains also Ⓟ**Compound Collargol Suppository,** Collargol 2½, Ethyl-Morphine Hydrochloride ⅔, Extract of Indian Hemp 2 grains, Glycerin and Cacao Butter *q.s.* In pelvic suppurations with pain, tenderness and general septic symptoms.

Unguentum Crédé. Collargol 15, Adeps Benzoatus 75, Cera Alba 10.

For eczema, syphilis, and gonorrhœa, and as a prophylactic to gonorrhœal ophthalmia.

Argentum Proteinicum, P.G.V., Ph. Ital. IV., P. Jap. IV., and P. Helv. (8% Ag.). P. Belg. P. Jap. (8 to 12% residue on ignition soluble in nitric acid). *Syn.* ✱Argein (T.M. 364945); Protargen; ✱Protargol, P. Austr.

Dose (internally).—1 to 3 grains (**0·06 to 0·2 Gm.**).

Trade Mark: 'Protargol' No. 322555. Patent 18478/1897 now ***expired.*** Three methods of making are given in the specification. (1) deals with the precipitation of Protalbumose 4·4 with Silver Nitrate 1, in 1½ of water and the subsequent heating on a water bath of the washed moist precipitate with a warm solution of Deuteroalbuminose 5, in water 4½. The precipitate dissolves and the soluble Silver Proteinate is obtained by evaporating under reduced pressure. (2) Peptone and Silver Oxide are used and in (3) Peptone and Silver Nitrate.

Manufacture.—We have no experience of the above methods—reference should be made to the details given under Albargin which is a similar preparation.

Characters.—A protein compound, containing 8% of silver, very soluble in water. *Decomposes* with heat.

Solutions ¼ to 1% (or stronger up to 10 and 40%) for ophthalmic use, and from 4 to 20% for wounds and ulcers, are prepared by rubbing the powder into a paste with water and diluting as required with cold or lukewarm (not hot) water. Stains the conjunctiva to some extent. Ointments 5 to 10%. It is alkaline to litmus and precipitates alkaloids, *e.g.*, cocaine salts.

Gonorrhœa well treated with ½ to 10% solutions, injections to be made every half-hour and retained five to ten minutes.—M.P.C. ii./11,559.

Bactericidal Power of the Various Silver Preparations.—The organic silver preparations are far less penetrating and active than silver nitrate. See *Vol. II.*

Prof. S. Theobald thinks that Protargol and Argyrol are responsible for many cases of conjunctival argyria, a collyrium containing half a grain of sulphate of zinc and 10 grains of boric acid is more cleanly, certain and promptly efficacious than the silver compounds.—L. ii./11,1570.

'Sterules' Ophthalmic of 10 and 25% solutions are prepared.

'Collapsubes' of Silver Protein Ointment in paraffin basis, 2% and stronger as required, with catheter attachment are prepared for urethral medication in gonorrhea.

Protargol Jelly. *Syn.* **Schindler's Jelly.**

Solve with slight heat Agar 1 in Distilled Water 200, when cold incorporate Protargol 1.

In treatment of gonorrhœa the Agar has the effect of holding the Protargol in contact with the urethral wall. It must not be used too early before the acute stage has well subsided as it may prove irritating,—nor should it remain in the urethra too long.—L. W. Harrison & C. H. H. Harold, R.A.M.C. Jl Oct., 1912.

Vide also Manual of Venereal diseases by Sir Alfred Keogh, Brevet Col C. H. Melville, Brevet Col. Sir William Leishman, and Major C. E. Pollock. Second Edition, 1916.

Leistikow's Bougies have a basis consisting of starch, sugar, dextrin and a little glycerin. A silver salt (*e.g.* Silver Proteinate ½ grain for each), is added and the mass is rolled into bougies. Before being used they are dipped in hot water, which makes the outside smooth and slippery. When left in the urethra they slowly dissolve.—*ex ibid.*

Neisser's Bougies. Silver Proteinate 1%, Antipyrin 2% in Cacao Butter or Glycogelatin basis. 4 inches long. For the treatment of Gonorrhoea.

Silver Gelatose. *Syn.* ✱Albargine (T.M. 258119); Patent 23,507/1900, expired 1914.

According to the patent specification Gelatose (produced by hydrolysis of glutin, etc. by acid or alkali) 10 Gm., is dissolved in water 10 Cc. and mixed after neutralising with Silver Nitrate 1·5 Gm. in water 5 Cc. The mixture is evaporated to dryness *in vacuo*. The salt thus obtained is a yellow white powder soluble to the extent of 50% in water.

Manufacture.—According to our experiments, the best results were secured by boiling gelatin 6 parts for about 5 minutes in 5% aqueous solution with the addition of sufficient nitric acid to render distinctly acid to litmus paper.

The solution is then cooled and neutralised with caustic soda, employing phenolphthalein as indicator, and is poured with stirring into a solution of silver nitrate 2 in distilled water—about 20 parts. To this mixture is now added three times its volume of alcohol 90% (filtering if not bright) and finally, with stirring, a sufficiency of strong sodium hydrate solution to effect complete precipitation, care being taken to avoid excess. The gelatinous body is now collected in a cloth, washed with a little alcohol, pressed dry and dried on porous tiles (preferably *in vacuo* and in the dark).

Coarsely powdered, it will dissolve in water and estimation by incineration with sodium carbonate and potassium nitrate and ultimate titration with N/10 Potassium Sulphocyanide Solution shows a content of approximately 15% of Silver.—W. H. M., June, 1917.

Analogous experiments with gelatin by hydrolysis with *alkali* were not so promising. Egg albumen was also tried without success. It may also be mentioned that any idea of evaporating solutions of the silver protein body at ordinary atmospheric pressure is out of question. Such a solution at once turns brown. The process outlined shows in general the method to be followed.

Characters and Uses.—A non-irritant compound containing 15% silver, of sand-like appearance. Soluble in water (about 1 in 2), and in alcohol 90% about 1 in 130. For gonorrhœa a 0·2% solution injected four or five times daily. 0·5 to 3% for ophthalmic use.

Incompatible with Chlorides and Tannin.

Silver Gelatose Enema.

Dose.—1 pint increased to 1½ pints of strength 1 grain in 1 ounce on successive days.

Chronic Bacillary Dysentery Treatment.—Medicines *per os* cannot well reach the parts affected,—except, perhaps, large doses of Bismuth which might help to coat and protect ulcers. **Medicated Enemata** advised :—

Experiments showed that Silver Nitrate killed the Dysentery Bacillus in 5 minutes up to a dilution of 1 in 10,000, yet in the presence of a little broth (*i.e.*, albuminous substances) it failed to kill in a dilution of 1 in 100 and 1 in 500—being at once precipitated by the broth. Albargin gave best results in broth, killing the Shiga Bacillus in 5 minutes up to dilutions of 1 in 500 and 1 in 1,000. Collargol, Ichthargan and Argyrol were inert in presence of broth, as also Copper Sulphate and Cuprol (Copper Nucleinate). Cyllin was active up to 1 in 2,500 and Iodine 1 in 1,000, as also Izal.

In bacillary cases the Silver Gelatose Injection is of great value— not in amœbic cases (for these *vide* Emetine).—L. Rogers, B.M.J., ii./13,1199.

Gonorrhœa treated by irrigation with 1 in 4,000 Albargin solution.—D. Lees, B.M.J. ii./21,480.

ℙ1 ARSENIUM.

As=74·96.

ℙ1 "*Arsenic and its Medicinal Preparations.*"*

(*Organic Arsenic Compounds are also* ℙ1.)

ℙ1 *Applicable to Ireland.* '*Arsenic and its preparations.*'

Agricultural and Horticultural Poisons.

According to the Poisons & Pharmacy Act, 1908, *Poisonous Substances, i.e., those containing Arsenic, Tobacco, or the Alkaloids of Tobacco* (*i.e., Nicotine in particular*), *used exclusively for the above purposes for destroying insects, fungi, or bacteria, or as sheep dip or weed killers, may be sold in Great Britain and Ireland by Pharmaceutical Chemists, Chemists and Druggists, and Registered Druggists and* by persons licensed by local authorities *who conform to the Regulations of the Privy Council as to storage, transport, etc., providing the Regulations at commencement of the Schedule* (*q.v.*), *the provisions of the Pharmacy Act* 1868, *and those appertaining to the Arsenic Act in the case of Arsenical Preparations are complied with.*

ℙ1 **Acidum Arseniosum.** As_2O_3=197·92. *Syn.* Arsenic; White Arsenic, Arsenious Anhydride, Arsenious Acid, Arseni Trioxidum U.S.

Made by roasting arsenical ores, occurs in white lumps or powder.

Dose.—$\frac{1}{64}$ to $\frac{1}{16}$ grain (**0·001 to 0·004 Gm.**).

Maximum single dose $\frac{1}{12}$ grain (**0·005 Gm.**); maximum daily dose $\frac{1}{4}$ grain (**0·016 Gm.**). Possible fatal dose—2 grains.

Soluble about 1 in 60 of water. This solution is practically neutral, at any rate is compatible with both acids and alkalis. The solubility in weak Hydrochloric Acid solution is about the same.

**Note.*—*A mixture, e.g., Hydrochloric Solution of Arsenic* 1 *drachm, Tincture of Ferric Chloride* 3 *drachms, Chloroform Water to* 4 *ounces.—is a Part I. poison—'Arsenic and its medicinal preparations,' and it cannot be brought into the general preparation or admixture paragraph in Part II. The Arsenic entry in the Schedule is specific—and the fact that other ingredients were added does not bring such a mixture into Part II.—A Police Court Case.—C.D. ii./* 14,5

More soluble in Alkaline hydroxide and carbonate solutions. According to our experiments it is very soluble in Glycerin at least 1 in 7—*cf.* Antimony Oxide. Physical characters of specimens, however, vary considerably.

Incompatible with Iron Salts, Lime Water, and Magnesia.

Uses.—It is given internally immediately after meals as a general tonic and nerve tonic, as for chorea, in diabetes and anæmia, as antiperiodic for malaria, for chronic skin diseases, and in association with iron, which it appears to render more easily assimilated. Latterly its efficacy in all forms of skin affections has been doubted. Small doses of Antimony it is stated may succeed when arsenic fails—especially in lichen planus. It is said to increase respiratory power (Styrian mountaineers add it to their diet) and to improve the complexion. All preparations of arsenic should be given after food. Externally it has a caustic action, and is put into the cavities of carious teeth to kill the nerves.

Rheumatoid arthritis is treated by Arsenic, but its action is slow and it must be given for weeks or even months.

Antihæmolytic action of Arsenic. Experiments show that whether in form of Sodium Arsenite or Arsenate, Arsenic exerts on the red blood corpuscles an action antagonistic to that of certain hæmolytic agents. It is thought that on this action in part at least depends the imperfectly understood benefit resulting from administration of Arsenic in blood diseases.—B.M.J.i./11,134.

In certain types of nervous vomiting in childhood, in obstinate cases, small doses of Arsenic and Opium, just before meals, are often immediately efficacious.

In tuberculosis may be of use.—Arsenic interferes with carbohydrate metabolism, so that after the exhibition of small medicinal doses fat is laid on, especially in the subcutaneous regions. Arsenic also has a favourable influence on growth.—Dixon, Pr. 1913, 1.

Arsenic may possibly predispose some people to an attack of pneumonia. Cases cited of children under treatment for lymphadenoma and other diseases suddenly developing pneumonia. If this observation be confirmed F. Parkes Weber suggests that the Arsenic whilst predisposing towards pneumonia must also exert a favourable effect on the reaction of the body towards the disease. Experiments might be made by trying the effect of Arsenical preparations in regard to experimental pneumococcal pneumonia in mice and rabbits.—B.M.J. i./13,337.

For ***further uses*** see Liquor Arsenicalis and Liquor Arsenici Hydrochloricus.

℞ **Pills and Tablets of Arsenious Acid** contain $\frac{1}{120}$, $\frac{1}{100}$, $\frac{1}{60}$, $\frac{1}{50}$, $\frac{1}{30}$ and $\frac{1}{20}$ grain. P.Jap.IV. Pilis contain **0·001 Gm.** ($\frac{1}{60}$ grain).

Toxicology. An interesting résumé in a paper on "The relationship of Medicine and Toxicology" of numerous *causes celebres* in which Arsenic and Antimony have been found. In one instance Arsenic, given apparently for poisoning, was found in the hair to the extent of 1/22 mgr. in 3 Gm. of hair.—Sir William Willcox, L. i./23,167.

In criminal cases of Arsenical poisoning the symptoms may be those of acute Arsenical poisoning, such as one would expect from a single dose, masked by those of prolonged action of Arsenic. Thus, symptoms of Arseni-

cal neuritis or renal or liver disease may be superimposed upon those of the acute gastro-intestinal symptoms.—Sir William Willcox, B.M.J. ii./22, 118 and L. ii./22, 129,139. *See Vol. II. for a further abstract of this paper.*

For Arsenic Eating, Arsenical Fly Papers, Weed Killers, Arsenical Wood Preservatives, Detection of Arsenic in Drugs, Organs of the Body, etc., and Various Arsenic Tests, see Vol. II.

Antidotes.

Stomach tube and emetics, olive oil, calcined magnesia in large quantity, mucilaginous drinks, stimulants and especially—

Antidotum Arsenici, Antidote to Arsenic. P. Dan. U.S. (Ferri Hydroxidum cum Magnesii Oxido.) P. Helv. and P. Jap. use Ferric Sulphate, and in other pharmacopœias.

Ferric Chloride 3 (or Strong Solution of Ferric Chloride B.P. '98,3), Water 17. When required for use, add this solution to Calcined Magnesia 1, previously mixed with Water 19, and shake well Should be freshly prepared, and given in doses of a tablespoonful every 5 or 10 minutes, until the symptoms are relieved. Ferric Hydrate should be administered in at least 12 times the quantity of the Arsenic supposed to have been swallowed. The Antidote contains about 2½% of the hydrate.

The diluted Ferric Solution and the mixture of Magnesium Oxide should be kept ready in separate bottles for immediate use.

The following is more expeditious in emergency. *Dilute Tincture of Ferric Chloride ½ ounce with half tumbler of water; add ½ ounce of strong solution of Sodium Carbonate.*

Ferri Hydroxidum cum Magnesii Oxido only delays the average time of death.—H. McGuigan, H. V. Atkinson and G. A. Brough, Jl. Am. Ph.A. per P.J. i./23,483.

Or give Liquor Ferri Dialysatus.

℞ **Liquor Arsenicalis, Fowler's Solution** (*Off.*). Fr. Cx. P.G.V. P. Jap. *Syn.* Liquor Potassii Arsenitis, U.S.

Dose.—2 to 8 minims (**0·12 to 0·5 Cc.**). Contains 1% of arsenous anhydride.—F.I.

Fr. Cx.—*Max. dose* during 24 hours, 25 minims approx.

Incompatible with Liquor Strychninæ Hydrochloridi. Employ Liquor Arsenici Hydrochloricus. Poisoning has occurred.

Exophthalmic goitre.—Arsenic is a routine treatment, 5 minim doses of Liquor Arsenicalis thrice daily except during one week in each month, or during the menstrual period, for 6, 8 or even 12 months. May be combined with Bromide, *e.g.*, 3 minims with 10 grains *t.d.* Tincture of Convallaria is recommended if pulse rate be over 110.

Pernicious anæmia. Arsenic is often given, but it has probably no real value. There is no specific remedy.—P. N. Panton and co-workers, L. i./23, 277.

Case of probable pemphigus vegetans, treatment Liquor Arsenicalis 3 minims *ter die p.c.* increased to 9 minims, with Iron and Strychnine. Locally Boric Acid fomentations, Orthoform dusted on and Ointment of Creolin, Lead, Zinc and Mercury.—P.R.S.M. Dermat. Sect., Jan. 1910, p. 23.

In Hodgkin's disease, arsenic should be pushed to the farthest limit short of toxic effects.—Whitla, Pract. Med.

Asthma treated by 5 minim doses with breakfast and dinner in conjunction with an alkaline Stramonium mixture.—P.J. ii./10,694.

Anæmic vomiting. 2 minims of Fowler's Solution thrice daily found of great value—to this may be added at once or in the course of a few days 10 grains of Citrate of Iron and Ammonia. Bismuth and Alkalis of little value. —A. P Beddard, Pr. March, 1912,359.

Herpes zoster relieved by Arsenic—15 drops of Fowler's solution daily being taken for some time.—H. Carlill, B.M.J. ii./17,9.

Arsenical Keratosis followed by cancer. Patient had a more or less general psoriasis, which was controlled by arsenic for 7 years. Warty growths appeared on palms and soles, and the arsenic was stopped. 14 years after cessation of the drug the hyperkeratosis on palms and soles was as obvious as ever, and a tumour, necessitating amputation, developed.—H. C. Semon, B.M.J. ii./22,975.

℞ **Liquor Arsenici Hydrochloricus** (*Off.*). **U.S.**

Dose.—2 to 8 minims (**0·12 to 0·5 Cc.**). Contains 1% of arsenious anhydride. Is compatible with acid mixtures.

In making this by the B.P. directions use the entire litre of water with the Hydrochloric Acid instead of half that quantity. Solution is more easily effected.

℞ **Tablets of Arsenious Acid and Mercuric Chloride** 1/64 grain (**0·001 Gm.**) of each.

In exophthalmic goitre have been given one thrice daily.

℞ **Mistura Arsenii Quininæ et Ferri**—*Syn.* BACELLI'S MIXTURE (slightly modified).

Dose.—½ to 1 ounce (**15 to 30 Cc.**).

Dissolve Quinine Sulphate 3 in Water 150 with aid of a little Dilute Sulphuric Acid. Then dissolve Green Ammonio-Citrate of Iron 5 in Water 150, mix and add Fowler's Solution 3. Employed in malaria.

Sodii Arsenis. *Syn.* SODIUM METARSENITE. $NaAsO_2 = 129·96$.

Dose.—$\frac{1}{64}$ to $\frac{1}{16}$ grain (**0·001 to 0·004 Gm.**).

A whitish powder soluble in water, slightly in alcohol. Has properties equivalent to Arsenious Acid.

℞ **Arsenii Bromidum.** $AsBr_3 = 314·72$

Dose.—$\frac{1}{60}$ to $\frac{1}{12}$ (**0·001 to 0·005 Gm.**).

In yellowish white deliquescent crystals, soluble in water. Is recommended for diabetes and epilepsy.

℞ **Liquor Arsenici Bromatus.** *Syn.* LIQUOR POTASSII ARSENATIS ET BROMIDI. CLEMENS' SOLUTION.

Dose.—1 to 5 minims (**0·06 to 0·3 Cc.**), once or twice a day.

Potassium Carbonate 1, Arsenious Anhydride in powder 1, Distilled Water 80. Boil until dissolved. When cooled, add Bromine (by weight) 2, and Distilled Water, *q.s.* to 100. Heat until decolourised. The solution is useful in epilepsy and diabetes with careful diet.

Contains approximately 1·5% Arsenic Acid, 0·5 to 0·6% Hydrobromic Acid, and 1·6 to 1·7% Potassium Bromide.

℞ **Granula Dioscoridis.** (P. Dan. and FR. Cx.).

Contains 1 milligramme Arsenious Anhydride. *Dose.*—1 to 5.

℞ **Pilula Arsenicalis et Strychninæ** contains $\frac{1}{50}$ grain (**0·0013 Gm.**) of each.

℞ **Pilula Asiatica.** *Dose.*—1 or 2 daily.

Arsenious Anhydride, $\frac{1}{12}$ grain (**0·005 Gm.**), Black Pepper ¾ grain (**0·05 Gm.**), Gum Acacia *q.s.* In chronic skin affections.

In psoriasis this is a convenient method of giving arsenic.

℞ **Pilula Ferri Arsenicalis.** *Dose.*—1 thrice daily.

Arsenious Anhydride, in fine powder $\frac{1}{60}$, Exsiccated Ferrous Sulphate 3, Syrup ½; in grains, for one pill; in grammes, for fifteen.

In chlorosis and anæmia most efficacious.

℞ **Pilula Ferri Arsenicalis cum Strychnina** is the same with Strychnine Hydrochloride $\frac{1}{60}$ grain.

℞ **Pilula Acidi Arseniosi et Ferri Redacti.**—MONCKTON.

Dose.—1 to 3 grains. Arsenious Anhydride, 12 grains. Reduced Iron 1 ounce. Excipient *q.s.* Mix.

℞ **Tablets,** of Arsenious Acid $\frac{1}{64}$ grain and Blaud's Pill 4 grains.
Dose.—1 to 4.

℞ **Tablets of Arsenic, Iron and Quinine** contain Arsenious Acid $\frac{1}{60}$ grain, Ferric Hypophosphite 2 grains, Quinine Acid Sulphate 1 grain.

℣ ℞ **Pasta Arsenicalis. Martindale.** For dental caries to destroy the nerve.

Arsenious Anhydride, levigated, 30, Plaster of Paris 40, Morphine Sulphate 20, Cocaine 5. Mix and add Clove Oil 5, Phenol 25. **R.D.H.** has Arsenious Acid 2, Morphine Acetate 1, Creosote *q.s.* to form a paste. *These two preparations are very poisonous.*

The equivalent of about $\frac{1}{16}$ grain of Arsenious Acid is sufficient.

Apply as follows:—Remove as much carious tissue as possible, exclude moisture and disinfect. Apply the paste as near pulp as possible and protect by concave cap. Seal cavity carefully with Mastiche in Chloroform.

Desirability of giving up the use of Arsenic in dentistry.—Sir Malcolm Morris.—B.M.J. ii./09.547.

℣ ℞ **Dental Arsenical Fibre.** *Syn.* **Arsenious Wool. Gossypium Arseniosum, R.D.H.** Arsenious Acid 5, Tannin 2, Morphine Acetate 10, Carbolic Acid liquefied *q.s.* to make a thin paste.

Mix with a sufficiency of finely cut cotton wool. Used in the same way as Pasta Arsenicalis. Some formulæ contain creosote *vice* carbolic acid.

℞ **Arsenii Iodidum.** (*Off.*). **U.S.** As I_3=455·72.

Dose.—$\frac{1}{20}$ to $\frac{1}{5}$ grain (**0·003 to 0·012 Gm.**), in a pill.

Soluble, forming a slightly cloudy acid solution in water 1 in 11, in alcohol 90% 1 in 40.

The two elements combine forming orange-coloured crystals. It should be recrystallised so as to exclude a melted mixture of Arsenium and Iodine, or Arsenium powdered 10, may be mixed with Iodine 51 in presence of water, digested at gentle heat and evaporated to dryness.

Solution 1% in 1 to 10 drop doses in milk, useful for lymphatic and scrofulous children, has marked iodine effect. Also used externally.

In diseases of the alimentary canal especially gastritis, in phthisis and in all cases of neuritis of great use. In epilepsy by gradually adding arsenic to the bromide mixture, the dose of the bromide may be lessened and will finally keep the fits under alone. Useful also in helping to clear up a pneumonic lung and in promoting absorption of pleuritic effusion.—L. i./11,1210.

The content of AsI_3 may be estimated by titrating a weighed quantity in an aqueous Sodium Bicarbonate Solution with decinormal Iodine Solution.

℞ **Injectio Arsenii Iodidi Hypodermica.**

Dose.—$\frac{1}{100}$ grain (**0·0006 Gm.**) in 6 minims (**0·4 Cc.**) of sterile water. The strength may be increased if desired.

℞ **Sterules, Hypodermic,** contain 1/100 grain.

℞ **Liquor Arsenii et Hydrargyri Iodidi** (*Off.*). P. Jap. III. (now omitted). *Syn.* DONOVAN'S SOLUTION

Contains Arsenious Iodide and Mercuric Iodide, of each 1%, or 87½ grains of each in Distilled Water *q.s.* to 20 ounces. *Dose.*—5 to 20 minims (**0·3 to 1·2 Cc.**). (U.S. has smaller average, 1½ minims.)

Given for syphilitic skin diseases.

Incompatible with potassium iodide and Sal Volatile (*cf.* Nessler's reagent); also with alkaloids and acids.

See also ℙ1 **Pilula Arsenii et Hydrargyri Iodidi.**

ℙ1 Mistura Arsenii et Hydrargyri Iodidi cum Phenazono.

Syn.—✱HYDRARSAN.*

Dose.—½ ounce thrice daily after food.

Donovan's solution 2 drachms, Potassium Iodide 1 drachm, Phenazone 1 drachm, Water to 6 ounces.

Method of Preparation. We find the following best:—

Powder the Antipyrin and the Potassium Iodide very finely, add a small quantity of water, then the Donovan's Solution in a mortar with very thorough stirring. By so doing solution is effected. Then gradually add the water with continuous stirring and shaking. In this way precipitation is almost entirely avoided and the mixture is produced slightly opalescent.

Suggested for arsenical treatment of syphilis. The effect seems more potent than that of simple Donovan's treatment. Although immediate improvement follows, the effect does not appear to be very permanent.—M.P.C. i./11,11. See also B.M.J. i./11,1429.

ℙ1 Potassii Arsenis.—*Dose.*—$\frac{1}{32}$ to $\frac{1}{16}$ grain (**0·002 to 0·004 Gm.**).

The dry salt $KAsO_2+HAsO_2+H_2O=272·044$ containing about 73% As_2O_3 made from arsenious acid and potassium bicarbonate.

Used occasionally in place of arsenious anhydride.

ℙ1 Cupri Arsenis. $Cu_3As_2O_6=436·63$. **Scheele's Green.**

Dose.—1/100 to 1/25 grain (**0·0006 to 0·0025 Gm.**).

Amorphous green powder, used in various intestinal affections, cholera morbus, cholera infantum, diarrhœa, dysentery and typhoid. Dose for adults $\frac{1}{5000}$ to $\frac{1}{3000}$ grains every 10 minutes for an hour, then hourly; for children, half this quantity. Small repeated doses essential. For chlorosis and functional anæmia, $\frac{1}{50}$ to $\frac{1}{25}$ grain thrice daily are given.

ℙ1 Acidum Arsenicum.—*Syn.* **Ortho-Arsenic Acid.**

$H_3AsO_4.\frac{1}{2}H_2O=150·992$.

Dose.—$\frac{1}{64}$ to $\frac{1}{12}$ grain (**0·001 to 0·005 Gm.**). A crystalline powder soluble about 2 in 1 of water, and very in Alcohol 90%. Arsenites are said to be twice as active as arsenates. The following salts are in use:—

ℙ1 Ferri Arsenas (B.P. '98). *Dose.*—$\frac{1}{16}$ to $\frac{1}{4}$ grain (**0·004 to 0·016 Gm.**) in a pill.

(For *Hypodermic Injection* see **Injectio Sodii Arsenitis et Ferri.**)

This is an amorphous greenish powder and consists of Ferrous Arsenate, $Fe_3(AsO_4)_2,6H_4O=553·536$ (not less than 10%) with Ferric Arsenate $Fe_2(AsO_2)_2=389·60$, and Iron Oxide. The Ferrous Arsenate rapidly oxidises in the air. In chronic skin affections of all kinds. TABLETS contain $\frac{1}{8}$ grain (**0·008 Gm.**).

The FR. CX. preparation (method given) has formula $(AsO_4)_2Fe_3+3H_2O$—Ferrous Arsenate—with a little Ferric salt. To be kept

*This name was suggested by J. C. McWalter, but it is also registered as a T.M., No. 350130.

in bottles sealed down with fat. *Maximum single dose* ¾ grain; maximum during 24 hours 2¼ grains approximately.

℞ **Sodii Arsenas Anhydrosus** (*Off.*) (**Exsiccatus,** *U.S.*) Na_2HAsO_4 =185·968.

Dose.—$\frac{1}{40}$ to $\frac{1}{10}$ grain (**0·0015 to 0·006 Gm.**).

Sodium Arsenate crystallises with either 7 [$Na_2HAsO_4,7H_2O$= 312·080], **U.S., Fr. Cx., Ph. Ned., P. Belg.,** or 12 molecules [M.W. = 402·16] of water. The anhydrous salt, in white powder, dried at 150° C., contains 61·8% of As_2O_5, and is soluble 1 in 3 of water at 25° C. 1 of the anhydrous salt equals 1·68 of the salt with $7H_2O$.

F.I. and P. Ital. IV., require the salt crystallised with $7H_2O$ and containing 36·85% of arsenic acid as adopted by many Pharmacopœias.

Soluble 1 in 5 of water (B.P. 1 in 6). Slightly soluble in alcohol

Fr. Cx. (*vide* above) has *max. single dose* ⅙ grain. *Max. during* 24 *hours*, ⅓ grain approximately.

Ulcerative Endocarditis. Influence of Arsenic (as Sodium Salt) advised.—J. Lycett, B.M.J., ii./22,402.

℞ **Pilula Sodii Arsenatis,** $\frac{1}{32}$ and $\frac{1}{64}$ grain.

℞ **Injectio Sodii Arsenitis et Ferri.**

This 'Arsenic and Iron Injection' has been largely employed in anæmic conditions in two strengths,—

"*No.* 1 *grade* (*weak*)." Hypodermic dose 1 Cc.=0·025 Gm. "Soluble Iron Arsenite," equivalent to ½ milligram of Arsenious Acid, and the other

"*No.* 2 *grade*" (double strength) 1 Cc.=1 mgr. of Arsenious Acid.

Injections may be made (as deeply as possible) with advantage at 1 to 2 days interval, and commencing for the first few doses with ¼ to ½ Cc. only of the No. 1 when the stomach is empty. Intramuscular (gluteal) Injections may be better tolerated. The course of the treatment extends over 1 to 2 months.

℞ **'Sterules'** of **"Arsenic and Iron"** are prepared of each of the above. *Dose.*—15 minims (**1 Cc.**) hypodermically.

Physicians should carefully specify which strength is required.

℞ **Guttæ Sodii Arsenitis et Ferri.**—"Iron and Arsenic Drops." *Dose.*—5 drops (or minims) containing ¾ grain (**0·05 Gm.**) of "Soluble Iron Arsenite" equivalent to $\frac{1}{64}$ grain (**0·001 Gm.**) of Arsenious Acid—(*cf. antea*) *per os.*

A gradual increased dose up to 20 drops is recommended during treatment.

Postural albuminuria in a boy of 12 healed by arsenic and iron and application of massage, and electricity to the legs greatly improved the condition.—L. i./10,19.

℞ **Injectio Sodii Arsenatis et Strychninæ.**

Dose.—5 to 10 minims (**0·3 to 0·6 Cc.**) hypodermically. Sodium Arsenate 2 ($\frac{1}{30}$ grain in 10 minims), Strychnine Hydrochloride 1 ($\frac{1}{60}$ grain in 10 minims), Water to 600.

℞ **Sterules, Hypodermic,** contain 10 minims of above.

℞ **Injectio Sodii Arsenatis et Strychninæ et Quininæ** contains 1 grain Quinine Acid Hydrochloride added to 10 minims of the above.

℞ **Sterules, Hypodermic,** contain 10 minims.

℞ **Liquor Sodii Arsenatis** (*Off.*), **U.S.**

Dose.—2 to 8 minims (**0·12 to 0·5 Cc.**). 1% of Exsiccated Salt.

℞ **Pearson's Solution of Arsenic** used on the Continent, is 1 of crystallised Sodium Arsenate ($7H_2O$) in Water 600.

℞ **Arsenical Cigarettes** are made of paper impregnated with sodium arsenate, so that each contains ¾ grain (**0·05 Gm.**) of the salt. The patient ought to inspire the fumes deeply three or four times.

℞ **Tablettæ Sodii Arsenatis Compositæ, U.C.H.**

Anhydrous Sodium Arsenate $\frac{1}{20}$ grain, Lupulin 3 grains.

Unguentum Arsenii Anserinatum—contains 5% (more or less required) of finely powdered Arsenium in Anserine basis (Prepared Goose Grease—*q.v.*).

Uses.—We suggest this for use in skin affections. It is possible that the therapeutic effect of Arsenic may be introduced by this readily absorbed basis—the preparation is certainly worthy of trial.

Simultaneous examinations of the urine for Arsenic would prove absorption or otherwise.

℞ ORGANIC ARSENIC COMPOUNDS.

In reviewing the Organic Arsenic bodies we deal first with those derived from the aliphatic or fatty series and pass then to the Aromatic or Benzol Ring Compounds. For the pioneer work on Chemo-therapy readers are referred to the XVth and XVIth Edition of the book.

We would warn our readers as *to the danger of 'pushing' the dose of any of the Organic Arsenic Compounds.* Signs of disturbance of vision during treatment should be looked for. Poisonous and untoward effects are dealt with under the individual chemical compounds.

An Organic Arsenic compound as distinct from the Inorganic form has the Arsenic in direct chemical combination with a carbon atom. This appears to greatly lessen its toxic properties. Furthermore, Arsenium is capable of acting either as a trivalent or pentavalent element and it has been found that Organic Compounds containing the element in its trivalent form are more potent in action upon protozoa. Compare, however, the recently prepared **Tryparsamide**, which contains As^v.

In the descriptions of the organic arsenic compounds the following terms are used :—

Arsinic Acid constitutes a dialkyl or dialphyl derivative of arsenic acid—*i.e.*, cacodylic acid—and its homologues, *e.g.*, phenyl-arsinic acid, $(C_6H_5)_2AsO\,OH$.

Arsonic Acid indicates arsenic acid, $AsO.(OH)_3$, in which one of the hydroxyls is replaced by an organic radicle. An *arsonate* is a salt of this acid.

French and German chemists do not as a rule make these distinctions.

Arylarsonate.—This term indicates an aromatic arsonate. Aryl indicates *e.g.*, phenyl, tolyl, xylyl, or naphthyl as applied to substituted hydroxyl in arsenic acid.

Arsenoic.—In French literature refers to aromatic arsenic bodies containing two atoms of arsenic believed to be coupled together by a double linkage—*e.g.* $C_6H_5-As=As-C_6H_5$, arsenobenzene, comparable with $C_3H_5-N=N-C_6H_5$. azobenzene.

(I). *Aliphatic Series.*

℗ Acidum Cacodylicum. **Dimethylarsinic Acid.**

$(CH_3)_2AsO.OH=138{\cdot}026.$

Dose.—½ to 2 grains (**0·03 to 0·12 Gm.**).

The ultimate product of oxidation of Arsenium-dimethyl (Cacodyle), *Syn.*—Tetramethyl Diarsine $(CH_3)_2As—As(CH_3)_2$, and of Cacodyle Oxide, *Syn.* Alkarsin, $(CH_3)_4As_2O=226{\cdot}036$. Colourless crystals neutral to Methyl Orange. ***Soluble*** about 2 in 1 of water, 1 in 4 of alcohol 90%, readily in chloroform, and although containing 54·3% arsenium, equivalent to 71·6% arsenious acid, it is relatively non-toxic—similarly with the Salts. It will be noted that this acid has only 1 OH group, hence it is not so toxic as its parent arsenic acid, with 3 OH.

KAKODYLE was discovered by Bunsen in 1842.

Sodium Cacodylate and Arrhenal, according to Fortescue Brickdale, are probably broken down in the body to such slight extent that large doses may be given without producing any therapeutic, much less toxic, effect. They appear, principally in the urine, unaltered. A small proportion is, however, oxidised and from this arsenic Ions are set free, exerting a mild action during a prolonged treatment.

℗ Calcii Cacodylas $[(CH_3)_2AsO_2]_2Ca=314{\cdot}096.$

Dose.—½ to 2 grains (**0·03 to 0·12 Gm.**) *per os* or intramuscularly.

A white amorphous powder. ***Soluble*** 2 in 1 of water, 1 in 2 of alcohol. In tuberculosis daily injections of ½ grain with a glycerin Solution of Calcium Iodide 10 grains and Ferrous Iodide 1½ grains per drachm internally have been found satisfactory.

℗ Ferri Cacodylas. $[(CH_3)_2AsO_2]_3Fe=466{\cdot}894.$

Dose.—¾ to 5 grains (**0·05 to 0·3 Gm.**) *per os* per diem, or ½ to 1½ grains (**0·03 to 0·1 Gm.**) hypodermically per diem. *Intrav.* 0·06 Gm. in 5 Cc.

Manufacture.—Precipitate the Ferric Hydroxide from a sufficiency of Ferric Chloride solution containing 1 molecular proportion of Ferric Chloride ($Fe_2Cl_6+Aq.$). Wash the precipitate and combine with Cacodylic Acid 6 molecular proportions, or precipitate Barium Cacodylate with Ferric Sulphate solution in molecular proportions.

Yellowish powder soluble 1 in 15 of water used for anæmia and chlorosis, also in glandular swellings, *e.g.*, in syphilis, hypodermically.

℗ Guaiacol Cacodylas. $(CH_3)_2.AsO.O.C_6H_4(OCH_3).H_2O=262{\cdot}125.$

Syn. CACODYLIACOL.

Dose.—½ to 2 grains (**0·03 to 0·12 Gm.**) *per os* or hypodermically in sterile oil in affected regions for tuberculosis. Soluble 1 in 25 water, 1 in 1·5 alcohol 90%.

℗ Magnesii Cacodylas. $[(CH_3)_2AsO_2]_2\,Mg,?H_2O.$

Dose.—¾ grain (**0·05 Gm.**) hypodermically, gradually increased (5% solution suitable). White amorphous powder soluble 1 in 3 of water.

Uses, etc., as the Sodium Salt, *q.v.*

℗ **Sodii Cacodylas.** P. Helv. Fr. Cx. and Supp. 1920. **Sodium Dimethylarsinate.** $(CH_3)_2AsO_2Na+3H_2O = 214{\cdot}066$.

Dose.—Average per rectum and hypodermically ½ to 1 grain (0·03 to 0·06 Gm.).

Fr. Cx. has *max. single dose* 3 grains and during 24 hours 3 grains approximately.

The salt of the above formula contains 35% Arsenium whilst the anhydrous salt contains 46·8%, equivalent to 61·8% arsenious acid. Fr. Cx. Supp. now gives a formula $+2\frac{1}{2}H_2O$ (previously anhydrous) and states the official salt must contain 75 to 78% Anhydrous Sodium Cacodylate. P. Ital. IV. requires it to contain 70%. In commerce it usually contains 18 to 25% of water. It should be carefully examined for inorganic arsenic, and, being a deliquescent salt, solutions should be standardised.

Soluble 2 in 1 water, in alcohol 1 in 1.

Neutrality. *We have found the salt, as made by certain manufacturers, to be neutral to phenolphthalein, but acid to litmus. In this condition it is painful to the tissues. On rendering neutral to litmus it is well tolerated.—W.H.M. Expts.* 1921.

Uses.—In tuberculosis generally (curative results come very slowly), in diabetes mellitus, exophthalmic goître, pernicious anæmia, cancer (particularly of the stomach), malaria, chorea, leprosy, psoriasis, and other chronic skin affections, and in all cases in which arsenic has been used, but when given by the mouth or per rectum may cause renal congestion with albuminuria and fall in the quantity of urine excreted.

As far back as 1862 Cacodylic acid was found to give excellent results in treatment of chronic skin diseases and in pulmonary tuberculosis. It was stated in 1865 (before Koch's discovery of the bacillus) to "impart to the blood of the patient a condition inimical to the tuberculosis." Murphy, in Chicago in 1910 obtained valuable results with Sodium Cacodylate in syphilis, has also used it to allay the pain of metastatic osseous carcinomata and for the various other purposes for which arsenic is indicated. Usual dose in syphilis treated by him has been 1 to 2 grains *intramuscularly*, with disappearance of the spirochetes from the primary chancre in 48 hours, the chancre becoming clean and soft in 72 hours. It seems to destroy the spirochetes. It possesses advantages over Arsenobenzol.

Chancre of the lower lip was treated by 1 grain doses of Sodium Cacodylate hypodermically into the pectoral muscles every 24 hours. This was done for 8 days. Then double dose for 4 days more. The chancre became more circumscribed. Then 3 grains daily for 7 days were given with marvellous result. Scab cleared away and there was ultimate recovery under 1 grain daily doses subcutaneously.

In syphilis it is thought to be of little value. May have slight action on papular and nodular syphilides but not to be compared with Mercury and Potassium Iodide.—Jl. Am. Med. Assn. 1916, 67, 2012, P.J. i./17,109.

Intravenously in sufficient quantity Sodium Cacodylate is better than Salvarsan. Dose never less than 10 grains and often as much

as 30 grains repeating the dose in 4 days' time. No toxic symptoms.—W. H. Forster, Jl. Amer. Pharm. Assn., 1917, 6, 142 (P.J. i./17, 275.)

Chronic broncho-spirochætosis rapidly recovered under sodium cacodylate *per os*.—E. C. Faust, Jl. Trop. Med. Jan. 1/23,14.

℗ **Elixir Sodii Cacodylatis** (Standardised).

Dose.—30 minims (equivalent to ½ grain of the salt).

This forms a palatable method of administering the salt.

℗ **Pills** contain ½ grain (**0·03 Gm.**).

The following formula in grains is useful :—

Sodium Cacodylate 50, Benzoin 50, Liquorice Powder 50, Acacia Powder 25, Alcohol 90% *q.s.* Divide into 100 pills. *Dose*.—1, three or four times a day.

℗ **Hypodermic and Intravenous Injection.** A sterile preparation is made and standardised to contain 0·05 Gm. (¾ grain) of Cacodylic Acid in 1 Cc. (15 minims approx.), a dose once in 24 hours. The same dose diluted with 4 drachms of water is used for **Rectal Injection.**

In psoriasis subcutaneously, but administration of Arsenic *per os* preferred.—L. i./09,967.

℗ **Sterules Hypodermic**, contain the above average dose.

℗ **Injectio Cacodylatum Compositum.** *Dose*.—(average) 15 minims (**1 Cc.**) containing Sodium Cacodylate ¾ grain, Iron Cacodylate ½ grain, Strychnine Cacodylate, $\frac{1}{64}$ grain. It should, we find, be rendered slightly acid with Cacodylic Acid at the finish.

Gautier recommends: ℗ Cacodylic Acid 5 Gm. Sodium Carbonate *q.s.*, Cocaine Hydrochloride 0·08 Gm., Creosote 6 drops, dissolved in Alcohol 8 Gm. with Sterile Water *q.s.* to 100 Cc., *i.e.*, 15 minims (**1 Cc.**) contain ¾ grain, (**0·05 Gm.**) of Cacodylic Acid for a dose—hypodermically—which is not to exceed 0·1 Gm. (1½ grains) *pro die*, the average being 0·02 to 0·05 Gm. every 24 hours.

℗ **Solutio de Cacodylato de Sodio Iodo-mercurico Esterilisado**

Sodium Cacodylate 4, Mercuric Iodide 0·5, Sodium Iodide 0·5, Water to 100.

Dose.—Each Cc. contains 0·04 Gm. of sodium cacodylate and 0·005 Gm. of mercuric iodide.

℗ **Strychninæ Cacodylas.** $C_{21}H_{22}N_2O_2(CH_3)_2AsO.OH = 472·323$, *Dose*.—$\frac{1}{30}$ to $\frac{1}{10}$ grain (**0·002 to 0·006 Gm.**).

White crystalline powder hardly soluble in water, readily soluble in chloroform. Should prove a useful salt.

℗ **Di-sodium Methylarsenate.** *Syn.* Sodium Methyl Arsonate, Arrhenal "New Cacodyle" $Na_2AsCH_3O_3,5H_2O = 274·069$. Fr. Cx.

Dose.—⅔ to 3 grains (**0·025 to 0·2 Gm.**) *per os* or hypodermically. Fr. Cx.—*Max. single* and during 24 hours *dose* 3 grains.

Prepared by the interaction of Methyl Iodide and Sodium Arsenate in presence of excess of Alkali.

Soluble about 1 in 1 of water, only slightly in alcohol 90%.

Arsenic-content. (With 5 mols. H_2O)=27·35%.

Uses.—Similar to Sodium Cacodylate *q.v.*

It is stated not to produce Cacodyle Oxide when given by the mouth.

℞ **Sterules, Hypodermic,** $\frac{1}{3}$ grain (**0·02 Gm.**), and $\frac{3}{4}$ grain (**0·05 Gm.**).

℞ **Mercury Salicyl-Arsonate.** *Syn.* ENESOL.

Dose.—$\frac{1}{4}$ to 1 grain (**0·015 to 0.06 Gm.**) intramuscularly.

A combination of equimolecular proportions of Arrhenal (reckoned anhydrous) and Mercury Salicylate. A white powder containing 38% mercury. It is best supplied in solution. This is said to be painless on injection in syphilis.

℞ **Sterules, Hypodermic,** are prepared $\frac{1}{4}$ to 1 grain in 30 minims for intramuscular injection.

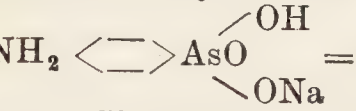
Tests to distinguish organic arsenic bodies.—*Vide Vol. II. of this Edition, q.v.* also for a number of *other Organic Arsenic Compounds* of the *Aliphatic* Series which, not having been tried in medicine, are of theoretical interest.

(II.) *Aromatic Series.*

℞ ***p*-Aminophenylarsonic Acid.** *Syn.* **Arsanilic acid, Aniline-arsenic acid.** $NH_2C_6H_4.AsO(OH)_2$=217·064.

Arsanilic Acid is weakly basic. Its Hydrochloride is immediately hydrolised by water. It is soluble, however, in methyl and ethyl alcohol. It has been employed as

℞ **Sodii *p*-Aminophenylarsonas.** *Syn.* ✱ARSAMIN, (T.M. 302016) ✱ATOXYL (T.M. 244636), ✱SOAMIN (T.M. 302133), SODIUM ARSANILATE. $C_6H_7N.AsO_3Na$ or



$= 239·054.$

Usually in commerce + $4H_2O$ = 311·12. The more hydrated forms lose water by efflorescence and commercial specimens give water content ranging from 3 to 5 H_2O.—G. T. Morgan.

Dose.—$\frac{3}{4}$ to 3 grains (**0·05 to 0·2 Gm.**). This dosage *per os* for syphilis has been advised daily for a week, then to be intermitted, but caution is recommended. Max. single dose 3 grains (**0·2 Gm.**)

Intramuscular injections (into the buttock) have been given of much larger doses, even up to 10 grains, dissolved in water at a time in a total course of 100 grains, at several days' interval in treatment of syphilis as a substitute for Mercurials. The upper third of the buttock is the usual site of injection.—*N.B. Not without danger.*—Avoid heroic doses.

Intravenously 1 to 5 minims (**0·06 to 0·03 Cc.**) of a 15% solution have been given, *i.e.* approx. $\frac{1}{7}$ to $\frac{3}{4}$ grain, but larger doses have been used, and we should advise 1 Cc. at least of diluent.—*Cf.* Intrav. Dose Table.

Solutions should be freshly prepared with cold boiled water and may be slightly warmed at time of injection.

Manufacture.—It was originally prepared by Béchamp *vide* Comptes Rend., 1863, Vol. 56, I., p. 1172, though the substance he obtained he thought to be Arsenic Anilide. By heating Arsenic Acid with an excess of Aniline the Arsenate is formed, this however is transformed by prolonged heating at 190°C. into *p*-Aminophenylarsonic Acid. This attained, one neu-

tralises with Sodium Carbonate, decomposes with Nitric Acid, collects the Acid, neutralises with Sodium Hydroxide, and evaporates to crystallise. Recrystallise from 90% Alcohol.

History of Organic Arsenic Compounds in treatment of protozoan diseases. This paper clears up the chemistry and origin of Atoxyl, giving credit to Béchamp and to H. W. Thomas (showing that it had value as a trypanocide). Atoxyl was exploited by the Germans, the process of making being concealed, and it was erroneously described by the firm in question as a compound of arsenious acid following on Béchamp's error. Fourneau showed that Atoxyl was the substance discovered by Béchamp.—Benjamin Moore, B.M.J.i./16,617

A white crystalline powder with slightly saline taste.

Arsenic Content.—Theoretically on $4H_2O$=24·09%.

Soluble about 1 in 6 of water (some samples may dissolve in a little less). Also soluble about 1 in 125 of alcohol 90% and more so in Methyl Alcohol. The Anhydrous substance is readily soluble in Methyl Alcohol but practically insoluble in Ether, Acetone, Benzol, or Chloroform.

Incompatible with Mercurials (*e.g.*, Perchloride.—L.i./o8,113, *cf.* Hydrargyri Arsanilas) and other heavy metals in solution, also with Acids.

Flavoring.—The compound is practically tasteless, but any desired Glyl or Syl may be used if required.

Uses.—Large quantities of arsenic can be given by it in skin diseases (psoriasis, lichen), in anæmia, syphilis, sarcoma, elephantiasis, malaria, tuberculosis and trypanosomiasis. Syphilis has been treated with 50% Ointment used on chancre of the skin.

It is stated to have less than 1/40 the toxicity of Arsenious Acid.

℞ **Pills of Arsamin** contain ½ grain and upwards. ℞ **Elixir Arsamin** contains ½ grain in each drachm and may be prepared stronger if required. ℞ **Sterules (Hypodermic) of Arsamin** ½ also ¾ grain in 15 minims (1 Cc.) of water, and larger up to 15 grains in each.

Purves Stewart has prescribed the Elixir considerably in cases of disseminated sclerosis and tabes without having witnessed bad effects from the drug, but cases must be watched carefully.

To sterilise Atoxyl prior to dissolving it in boiled water for injection, it may be first heated with a little spirit, in which it is only slightly soluble.

℞ **Arsamin Paste.** 10% may from our experiments be prepared with **Pigmentum Caseinæ**, *q.v.*

In syphilis this has been used to primary sores, with large injections of Atoxyl simultaneously into the buttock.

℞ **Tablets Arsamin** contain one grain. ℞ **Capsules Arsamin** 1 and 2 grains, also ℞ **Capsules Arsamin** 1 grain with **Blaud Pill** 5 grains and with **Quinine** 3 grains are prepared and are useful for treatment in cases where the added drugs suggest themselves.

For Methods of Testing Sodium Arsanilate for inorganic Arsenic, see Vol. II.

In Trypanosomiasis.—Thomas of Liverpool first applied Atoxyl in trypanosomiasis. 2 Cc. of saturated solution (about 20%) as first dose—repeated after 18 days. Immediate effect was magical, but it only helped the sufferers in dying. Koch thought it to be a specific.

Initial doses of ½ Gm. increased to 1 Gm. have been given.—L. ii./o7,767.

p-Amino-phenyl-arsonic Acid acts promptly on trypanosomes, the *meta*-Acid has less effect and the *ortho*-Acid no effect at all. Both the presence and the position of the Amino group are important factors.—L. ii./12,1822. See also Fortescue Brickdale, B.M.J. ii./12,1489.

Sodium Arsanilate plus Mercury.—Combined have been used without much favour.—**Sodium Arsanilate plus Orpiment,** (Arsenic Trisulphide $As_2S_3 = 246{\cdot}10$) were also largely given. The trypanosomes probably never become resistant to inorganic Arsenic.

Sodium Arsanilate plus Tartar Emetic were also tried.

In Syphilis early application is necessary. Large doses may produce blindness. ½ Gm. dose every other day should not be exceeded—10 days treatment, then 14 days interval. Primary chancres remained stationary even on prolonged treatment

Relapsing Fever. Large doses have been given, *e.g.*, doses of from 9 to 23 Cc. of 20% solution.

Kala azar. Success has followed 3 grains every third day.

GENERAL REFERENCES TO SODIUM ARSANILATE.

In interstitial keratitis 0·25 to 0·5 Gm. once a week in mild cases, more frequently in severe, efficacious—not more than 6 Gm. in all to be given. A course of 12 injections usually cures or almost cures, treatment to be in conjunction with mercury intramuscularly.—S. Stephenson.

On carcinomata effect is sometimes most striking—tumour ceases to grow, then becomes smaller and harder. In a case of epithelioma of the tongue the shrinkage was obvious. There is, however, not a proportionate increase in strength—in fact an asthenia was produced requiring treatment.

Elimination is by the skin and especially by the kidneys. May cause transient albuminuria. Part may be taken into the body, but the bulk is in the urine unchanged or as allied substance.

Ehrlich pointed out that a drug can only be of value in infectious diseases, if taken up more readily by the parasite—bacterio-tropous (*syn.* ætiotropous)—than by the organism—organotropous. Many protozoa take up dyes—**Trypan Red** (from 1 molecule tetrazotised benzidene-mono-sulphonic acid and 2 molecules sodium naphthylamine-3 : 6-disulphonate) is active against trypanosomes.

He advised the use simultaneously of a number of substances, *e.g.*, Atoxyl, Parafuchsin, Trypan Red and Trypan Blue,* chosen in such manner that their actions are concentrated on the parasites—distributed over several different organs. Combine a potent substance which will kill off the bulk of the trypanosomes with a weaker one, which will account for the few remaining trypanosomes, which otherwise would certainly cause a relapse in course of time. Mercuric Chloride has been demonstrated a useful adjuvant to Atoxyl treatment—alone it (Mercuric Chloride) is incapable of complete curative action

In man the excretion of Atoxyl usually amounts to 50–90% within nine hours. The amount remaining in the body is to some extent decomposed so that after sufficient time has elapsed the ordinary toxic symptoms of inorganic Arsenic are produced. Fortescue Brickdale can see no advantage in giving in syphilis and the grave forms of anæmia a rapidly eliminated form of Arsenic in large dose rather than one which being slowly excreted can be given in small

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* **Trypanblue** $C_{34}H_{24}N_6O_{14}S_4Na_4 = 960{\cdot}650$ has been proved successful in the treatment of piroplasmosis,—*biliary fever* or *malignant jaundice* of the dog (canine *piroplasmosis*) and *red water* or *Texas fever* of cattle (bovine piroplasmosis) It is also stated to be a certain and immediate cure for distemper, but we know of a case in which it proved useless. *Dose.*—Dogs 2 months old of 3 to 5 lbs. weight, 3 Cc. to 4 Cc of ½% Solution. From 10 lbs. to 60 lbs. weight, dose ranges from 3 to 20 Cc. of Saturated Solution (1% approx.). Subcutaneously, or in preference intravenously, into the vena saphena in the hind leg of a dog.

Cattle.—*Dose.*—100 to 200 Cc Saturated Solution.

Trypan Blue destroys trypanosomes in the body of both men and animals (nagana). Its introduction promises to open up vast tracts of tropical Africa. —Prof. W. G. Dixon, B.M.J. ii./22,410.

Chlorazol Blue 3 B is a color closely related and has been used instead of Trypan blue.

doses. In the case, however, of trypanosomes the organic Arsenic may play a different role. Here it is thought that a small amount combines, through the Amido group, with the proteins of the blood plasma, from which the Arsenic is set free by an oxidation process, and thus in a nascent condition kills the trypanosomes—B.M.J. ii./10,1598.

Cerebro-spinal meningitis treated intravenously in 3 to 5 grain doses. *Caution*: this appears excessive.—B.M.J. i./10,193.

In chronic malaria, skin diseases and syphilis over 2,500 intramuscular injections of 2 Cc. of 15% solution (heated in an autoclave not in the open air) every second day during a fortnight, and then a rest of the same period. In venereal disease not specific, but by alternating with a soluble salt of Mercury reduction of amount of mercury necessary by at least half —L. ii./10,1257.

Atoxyl does not act *in vitro*, but it acts in the living body. Substances act differently in the body and the test tube.—L. i./13,1347.

For poisonous effects and their treatment, see Vol. II.

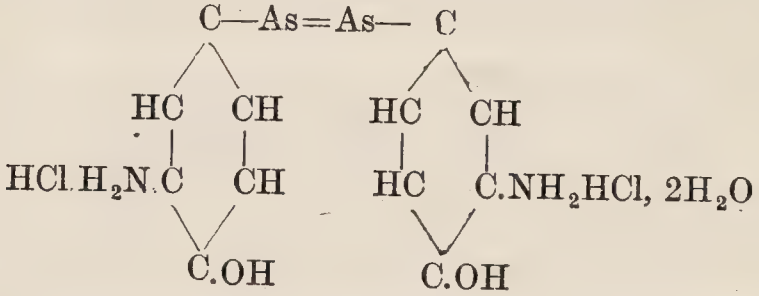
For further details of action of Arsanilate and allied bodies on Trypanosomes *vide* 'Salvarsan,' by M. & W., p. 168 *et seq.*

℗ **Sodium P-Hydroxy-M-Aminophenylarsinate or '189.'**

First results of treatment show that this salt has favourable action on human syphilis although not so powerful or constant in its results as Salvarsan. It is relatively slightly toxic and is supported by patients who do not tolerate other arsenical preparations.—J. C. S., 1922, Ai 300.

✱ **Stovarsol** (T.M. 432473). *Syn.* ACETYL-AMINO-HYDROXYPHENYL-ARSONIC ACID. *v.p.* 530.

℗ **Dioxy-diamino-arseno-benzol Di-hydrochloride,**—ARSENO BENZOL*, ARSEN-PHENOL-AMINE, AMINO-ARSENO-PHENOL, ✱ARSENO-BILLON (T.M. 413809), DIOXYDIAMIDO-ARSENOBENZOL DI-HYDRO-CHLORIDE, ✱KHARSIVAN (T.M. 363586), ✱SALVARSAN (P. Argent II.) EHRLICH-HATA, or '606, is believed to have the constitution :—



Or written empirically $C_{12}H_{12}O_2N_2As_2(HCl)_2\,2H_2O$ = 475·06.

For ***Dose and Methods of Injection*** see p. 208 *et seq.*

PATENTS.—By the Patents Designs and Trade Marks (Temporary Rules) Act, 1914, licences to use German-owned British patents were granted to several firms. These have since been suspended and the British and French firms use the patents by agreement with the original German owners. The patents concerned are 13485/10, 5595/11, 7865/12 and 8219/12. The patent 3934/07 concerning 'Manufacture of Acidyl Derivatives of *p*-Aminophenylarsinic Acids' has lapsed by time.

Details of procedure are given in "Salvarsan" by M. & W.

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* The preparation is on the market under this name in hermetically sealed glass tubes each containing 0·6, 0·5, 0·4, 0·3, 0·2 or 0·1 Gm. filled with inert gas to prevent oxidation—if discoloured—either grey or brownish—must not be used. ✱ARSENOBENZOSOL is a Trade Mark: No. 326303.

The Board of Trade Licences in question entail the examination by biological tests by an approved authority. The Medical Research Committee undertook in the first instance examination of the preparations to satisfy the Board of Trade and rejected some samples.

It may be noted that Patent No. 6322/15 dealing with Improve- product in making Arsenobenzol,—is British owned.

The following are also ancillary to the main patents for making Arsenobenzol:—No. 11,625/11 ("Substituted Aromatic Arsines") and 15,931/12 ("Arseno preparation").

Further, Patent 17,619 of 1907 entitled "Reduction-products of *p*-amino-phenyl-arsinic acid and its derivatives" became void. The substance referred to in this patent is known as '418' (Ehrlich's number), and is similar to Arsenobenzol.

TRADE MARKS: "SALVARSAN" and "NEOSALVARSAN."

No. 310235 for the former and Nos. 340386 and 340387 for the last-mentioned were "suspended" in favour of British houses during the war, but this order has since been *revoked* (1923).

Introduction.—Ehrlich and his assistants (notably S. Hata of Tokyo) conducted research (*vide* "Die Experimentelle Chemotherapie der Spirillosen"), which led finally to the introduction of Arsenobenzol for treatment of syphilis and many other affections.

Treatment with this chemical compound of a person infected with syphilis it was hoped would effect a "sterilisation of the system."

For further notes on the Introduction of the compound, Parasitotropic and Organotropic Compounds, Therapia Sterilisans Magna, Antibody Formation Theory, see Vol. II.

In the "Note on the Chemistry of the Injections" (*see Vol. II.*), we have calculated the exact quantities of alkali required to neutralise or dissolve given doses of Arsenobenzol Di-hydrochloride according as a suspension or solution is desired, thus reducing the possibility of adding marked excess of caustic alkali, which would be (and probably has been) attended with grave consequences to the patient if injected in the gluteal muscles, subcutaneously or by the intravenous method.

Arsenobenzol solutions kill protozoa *in vitro*, and the $\frac{C}{T}$ dose ratio, *i.e.*, $\frac{\textit{Curative dose or sufficient to destroy all parasites}}{\textit{Toxic dose or Max. dose which patient can tolerate}}$ for the substance is satisfactory.—Ehrlich maintained that this ratio must be $\frac{1}{3}$ or less for a drug to be of value in this type of disease.

The percentages of deaths and of evil after-effects consequent on the treatment has undoubtedly been small when we take into account the nature of the substance and the technique required in its administration.

Manufacture.—*p*-Oxyphenylarsonic acid—$C_6H_4.OHAsO(OH)_2$ on nitration and subsequent reduction under certain conditions

produces a condensation of two molecules forming ultimately the Dioxy-diamino compound. This base is then converted into the Di-Hydrochloride.

Vide Patent Specifications *antea* for further details.

Commercially, free and combined Sulphur have been found in it.—F. L. Pyman, C.D. i./20,404.

The varying toxicity of commercial samples is apparently due chiefly to presence of sulphonic derivatives formed during reduction process with sodium hyposulphite. If ***hypophosphorous acid*** is used the product is relatively non-toxic.—J.C.S.A., 1920, 42, p. 2402. T., 1921, 1109 and 1415.

Salvarsan becomes inactive if the NH_2 groupings are methylated—J. M. Fortescue-Brickdale, B.M.J. i./15,106.

The compound forms a bright yellow powder containing 31·6% approximately of Arsenium.

Soluble in water 1 in 5 forming a thick syrupy liquid with strongly acid reaction ; 1 in 3 Methyl Alcohol and in Glycerin ; 1 in 12 in Ethyl Alcohol. Insoluble in Ether.

The Di-Hydrochloride may be converted into the basic substance Dioxy-diamino-arsenobenzol (No. 592 in Hata's series) of the formula $C_{12}H_{12}O_2N_2As_2$=366·042 by treatment with alkali. We shall deal with this later, but may here define the base as an unstable, easily oxidisable, *insoluble* substance containing 40·96% of Arsenium —readily soluble however in Alkalis.

Specific Nature of the Treatment.

Ehrlich made numerous statements regarding *specific action* of Salvarsan. The subject is fully dealt with in " Salvarsan " by M. & W., pp. 19, 20.

Uses.—It is now fairly well determined that a syphilitic chancre, a secondary syphilide or ulceration, or a tertiary gumma or ulceration, yields remarkably to this body, as also to Novarsenobenzol ; every stage of syphilis treated, however, *requires Mercury subsequently*. They are also of value in acquired or congenital syphilis, but in parasyphilitic affections they have not yet been proved of great benefit, but may prevent their progress.

Visceral syphilis, Discussion on—especially of the central nervous system and cardio-vascular system. Sir Clifford Allbutt states that the syphilitic process wherever it is found consists in a lymph-arteritis with consequential irritative and atrophic effects. The division of syphilis into time periods—primary, secondary, tertiary and visceral—is misleading. The pyrexial phase, slight as it may be, indicates a general syphilitic sepsis in which the cerebro-spinal system is soon involved. Early necropsies have shown that in the pyrexial phase the aorta, brain, liver and other viscera become infected and the cerebro-spinal system does not long escape.—B M.J. ii./21,177.

Although Salvarsan may kill all spirochetes in the skin and mucous membranes it may not go deeper—hence, both exospinal and intraspinal treatment may be needed from an early stage. Col. Harrison has made the 'unpleasant' (—reasonable—W. H. M.) reflection that within limits the more parasites we kill the better time it may be for the rest. Small repeated doses preferable to two or three big doses.—Sir T. Clifford Allbutt, B.M.J. ii./21,177.

The spironema is *not killed by Salvarsan—the body of the patient co-operates.*—H. H. Dale, B.M.J. i./22,807.

Organic Arsenic Compounds have no marked effect on the spirochaetes in the test-tubes, but they destroy them in the body.—Prof. W. E. Dixon, B.M.J. ii./22,410.

Note.—Writers designate the causative organism of Syphilis, Spirochœta, Spironema, Treponema, etc.

Use in Malaria, Yaws, Frambœsia, Leprosy, Pernicious Anœmia and other diseases—It is thought that not only is the substance specific for syphilis, but that it probably acts against *Spirillosa* in general.

Tertian Malaria has been cured but quartan does not seem to respond in the same way.—W. H. Willcox, B.M.J. i./16,473.

Benign tertian infection. Arsenobenzol intravenously has a definite parasiticidal effect, but not on any stage of the malignant subtertian parasite; it intensifies Quinine—J. Pratt-Johnson and co-workers, B.M.J. i./21, 81.

Yaws has been treated by intramuscular injection. 0·6 Gm. injected into the buttock gives astonishing result. 12 intramuscular injections of Hectine given daily, only equal in result one dose (0·6 Gm.) of Novarsenobillon. —N. Cantlie, Jl. Trop. Med., Feb. 1/23,37.

Within 40 hours of injection of Neosalvarsan all treponemata demonstrable by Levaditi's method disappeared from early yaws.—E. W. Goodpasture, Jl. Trop. Med. July 2/23, 234. See also *ibid*, July 15/22,240.

Frambœsia, five cases (3 adult, 2 children) in Trinidad injected with 0·6 Gm. in an emulsion of 5 to 6 Cc. sterile Olive Oil for the adults injected deeply into the muscle of the buttock. Improvement in 24 hours, the yaws tubercles drying up from the periphery.

Among 900 cases of frambœsia in Surinam there were only three unsuccessful.—L. ii./11,1303.

Vincent's angina.—A throat swab dipped in Glycerin and this in the powder and rubbed on to the affected parts in the throat. Not painful. Relief afforded after a few hours.—L. ii./13,1120.

Leprosy.—Some reports have been favourable. References in our last Edn., p. 194.

Pernicious anœmia. Two cases each received four doses 0·2 to 0·3 Gm. intramuscularly. Marked improvement. Red and white corpuscles as also hæmoglobin content increased.—Byrom Bramwell. (This authority introduced the Arsenic treatment of pernicious anæmia in 1875).

Salvarsan not advised, as it is best given intravenously, and there would be danger in its use in pernicious anæmia.—W. H. Willcox, Pr. Sept. 1913.

In *small-pox*, no influence; *typhus* favourable; in *relapsing fever* more active than in syphilis.—B.M.J. E. ii./11,4.

Rat-bite fever successfully treated by Novarsenobillon 0·4, 0·6 and 0·9 Gm. at intervals.—G. C. Low and R. P. Cockin, B.M.J., i./18,203.

Kharsivan and Neo-Kharsivan in diseases other than syphilis—lupus sycosis and eczema.—G. Stopford-Taylor, B.M.J. ii./18,431.

Experimental determination of minimum lethal, minimum effective and maximum tolerated doses of Arsenic and Antimony compounds in trypanosome infection.—C. Voegtlin, H. W. Smith and co-workers, per T.D.B. 17/21,330.

Intravenously found to abolish syphilis in rabbits.—H. Nichols and J. Walker, per Jl. Trop. Med., June 15/23,223.

Cancrum oris in Formosa. Salvarsan has reduced mortality rate from nearly 100% to 25%.—D. J. Maxwell, Jl. Trop. Med., July 2/23,235.

On *microfilariæ bancrofti*, intramuscularly has toxic action. Periodical injections suggested for persons suffering from lymphangitis, funiculitis, etc. taking into consideration age and general condition of patient.—F.Noc., per Jl. Trop. Med., July 2/23,238.

Average Dose (*Intravenous*) for *adult males*—0·3 to 0·4 Gm. An injection of the same dose may be ***repeated*** one, two, three or four weeks later. In feeble patients, or where the central nervous system or heart is affected, smaller doses (0·1 to 0·3 Gm.) may be given, and repeated, if the first injection has been well tolerated, after a few days. Generally a course of 4 to 8 doses is given at intervals of 8 or 10 days—often in conjunction with Mercury. See p. 212.

Three series of injections should be given with two months interval between each. The dose may perhaps be increased a little in the second and third series. In this intermittent form of treatment Arsenobenzol is to be continued until the Wassermann reaction is negative.

Fractional doses.—Intramuscular injections of 0·1—0·2 Gm. suspended in oil, are made every second day until a total of 1·2 Gm. has been injected.

For Children doses of 0·2—0·3 Gm. are given.

For Infants doses of 0·02—0·05—0·1 Gm. have been employed.

N.B.—All solutions and suspensions of *Salvarsan must be freshly made with aseptic precautions.* The main issue is to counteract infection as rapidly and completely as possible.

The ***highest dose*** employed by early workers was 0·0096 Gm. per kilo body weight. A 12-stone man would therefore receive at most 0·8 Gm.

The *toxic dose* subcutaneously for rabbits is said to be 0·15 Gm. per kilo, *i.e.*, approximately 10 to 15 times the highest dose used in man. As an average rabbit weighs 2,000 Gm., the toxic dose for these animals would be about 0·3 Gm. We had this confirmed.—W. H. M., 1914.

Interval between doses.—An interval of four weeks should elapse between full doses.—W. H. Willcox, B.M.J. ii./16,476.

The Principal Methods of Injection are :—

(1) **Intravenous.** (2) **Intramuscular** into the gluteal muscle.
(3) **Subcutaneous** into tissue adjoining bases of shoulder blades.

(1) Intravenous Injections.

Dose.—As a rule less of the preparation is used than by the other methods, the average being 0·3 to 0·4 Gm. for women and 0·4 to 0·5 Gm. for men, *diluted to about* 200 *to* 300 *Cc.* repeated in two, three or four weeks. See also Average doses, *antea.*

Preparation of the Injection.

Arsenobenzol 0·6 Gm. is added to about 30 or 40 Cc. Sterile Distilled Water contained in a 300 Cc. stoppered cylinder (a few glass beads added assist in dissolving). Dissolve by shaking thoroughly, add 1·2 Cc. (about 23 drops) of 15% *w/w* **Sodium Hydrate Solution.** A precipitate is formed which redissolves. Dilute the clear yellow solution to 300 Cc. with Saline Solution of 0·5% strength. One or two more drops of Sodium Hydrate may be required.

Note.—0·5 Gm. requires 19 to 20 drops of the Sodium Hydrate Solution.

0·4	,,	,,	15 to 16	,,	,,	,,	,,	,,
0·3	,,	,,	12	,,	,,	,,	,,	,,
0·2	,,	,,	8	,,	,,	,,	,,	,,
0·1	,,	,,	4	,,	,,	,,	,,	,,

The minimum amount of alkali should be employed as found experimentally sufficient to dissolve. The quantity of Alkali thus added converts the body into the *Di-Sodium Compound.*

Each 50 Cc. of the solution contains 0·1 Gm., *i.e.*, 150 to 200 Cc. form an average dose for women, and 200 to 250 Cc. for men.

Alternative Method.

In our experience it is best to add Soda Solution q.s., to make the base—i.e., 0·5 Cc. for 0·6 Gm., mixing thoroughly; dilute with a little Saline and then add the Sodium Hydrate Solution q.s. to dissolve (about 1·25 Cc. in all), finally diluting to 300 Cc. with Saline solution.

For a note explaining the Chemical reactions on treating Salvarsan with Alkali, see Vol. II.

Administration of the Injection.

A sterile douche tube to hold 300 Cc. or less of the Solution and graduated in 50 Cc. is connected with a rubber tube and cannula arranged for transfusion. An additional vessel containing Normal Saline is useful.

The process may be varied from this *gravitation method* to one in which slight pressure is employed—by a syringe piston attachment.

The injection should be given at about 105° F., *i.e.*, a little above blood heat. It is generally painless.

The arm supported in a comfortable position, a prominent vein at the bend of the elbow is selected and the skin over it sterilised with Iodine solution, a rubber band is then applied to the upper arm so as to retard the venous return without abolishing the radial pulse, and the patient made to clench and unclench his fist a few times to make the selected vein stand out well—the intravenous injection is then made in the usual way. As a general rule, about 30 Cc. per minute can be safely given, *i.e.*, the injection occupies about 10 minutes. A little Saline solution is allowed to flow into the vein, this is followed up with the amount of Salvarsan solution desired, and finally more saline is passed in to clear the needle and neighbourhood of the remedy.

Patients should be treated in bed and observed for at least three days. If patient shows during administration any signs of collapse, injection should be stopped at once.

Intravenous Apparatus.

The author's apparatus is arranged for all three forms of injection.—Contains "Record" Syringe with Platinum Needle 4 Cm. long, which is adjustable by an adapter on to the douche tube and douche cylinder—this being graduated to 300 Cc. in 50 Cc.s. Contains also the necessary reagents (Acid and Alkali), basin, rod, etc.

H. W. Whale uses a Syringe 100 Cc. capacity with several advantages. Two syringefuls suffice for a dose of the Neo compound or 3 for Arsenobenzol. —B.M.J. ii./13,1491.

H. W. Abbott gives a clear account of the technique in injecting Arsenobenzol preparations. His apparatus is a "gravity" one provided with a 40 Cc. douche tube to contain the Novarsenobillon (dissolved in 20 Cc. of distilled water), rubber tubing 40 inches in length and a special needle

with a point of correct bevel—neither too long nor too straight. The gravity method is both safe and simple.—L. ii./17,616. See also L. W. Harrison, B.M.J. ii./18,517.

Numerous other workers have devised special forms of apparatus—details in our last edition, p. 198.

(2) Intramuscular Injections.

Intramuscular injections are more effective than intravenous, but they produce great after pain.—Spec. Com. Report—Medical Science, Sept. 20, 528, per Pres. Feb. 21, 104.

It is difficult to persuade a patient to have a second intramuscular dose. Intravenously there is no trouble.—J. A. Butler, B.M.J. i./18,328.

Preparation of the Injection.—(*a*) **Alkaline Solution.**—Triturate 0·3 Gm. Arsenobenzol in a sterile mortar with 12 drops of 15% *w/w* Sodium Hydrate Solution and dilute with Distilled Water to 5 Cc. or the desired volume. For larger or smaller dose use corresponding amount of Alkali (*cf.* Intravenous Injection). The injection is made into the upper exterior part of the gluteal muscles. The injection should be made deeply and slowly, so as to avoid tearing and hæmorrhage of the muscles. The neighbourhood of the sciatic nerve must be carefully avoided.

(*b*) **Sterile Aqueous Solution of Arsenobenzol** 10%, also (*c*) Liquid Paraffin, Olive, Almond or Sesame **Oil Suspensions** 10% strength have been used*, as also (*d*) the **Neutral Suspension.** To prepare this suspension triturate *e.g.*, 0·5 Gm., in a sterile dish with 8 drops of Caustic Soda Solution 15% (*w/w*) and then at first drop by drop, with constant stirring the requisite quantity (about 5 to 10 Cc.) Sterile Water. (For 0·6 Gm. the final volume should be 10 Cc., otherwise it is too thick.—W. H. M. For all these a wide lumen needle will be wanted.) The fine suspension produced is tested with litmus paper for neutral reaction. According to the reaction a drop of Caustic Soda Solution or of Dilute Hydrochloric Acid may be added.

The *Intramuscular Injection* is directed by some to be followed by an Intravenous Injection.

Apparatus used.

For *intramuscular injection* a 10 Cc. sterilisable syringe with 10 Cm. needle may be employed. For subcutaneous use 4 Cm. needles are sufficiently long.

Blood must not escape from the puncture before injection. The injection must be made slowly to avoid dissociating the muscular fibres roughly, and it must be intramuscular—none of the liquid must escape into the surrounding tissues. The skin must first be wiped with Iodine Tincture. The part may be massaged afterwards to spread the injection over as large an area as possible.

The patient should remain lying on his stomach for a while. He should rest for three or four days.

* The acidity of these preparations (*b*) and (*c*) is in our opinion an objection.

Intramuscular injections into the *arm muscles* have also been practised.

Oily Injections are carried out in two movements as for insoluble Mercurials. Subcutaneously 0·3 Gm. in sterile Almond Oil gave good results.—B.M.J. i./11,100; ii./11,214.

(3) Subcutaneous Injections.

The subcutaneous method is occasionally used. If made perfectly neutral there is little pain, and in any case, pain in the back is better borne than in the buttock muscle. The best place for this method of injection is about midway between spine and lower end of the shoulder-blade. Injections in the chest are also given—in men into a fold of tissue below the nipple, in women below the mammary gland.

Subcutaneous injection is not so suitable as intramuscular where the skin is taut—*e.g.*, in young people or in emaciation—for these the intramuscular dose would be preferable. For several days a hard mass can be seen and felt, this gradually disappears.

Subcutaneous injections produce slow and protracted action. *Olive Oil Suspensions* are *non-irritating* if freshly made each time, and are to be preferred to Paraffin emulsions, as being more readily absorbed.

Not infrequently difficulty in breathing occurs, especially in plethoric individuals, owing to a spasm of the intercostal muscles. Emphysematous patients should have the injection intramuscularly.

Rectal Injections.

Ehrlich stated at the International Congress, 1913, that the action of Arsenobenzol on spirochætes is an indirect one, a third factor found in the body fluids being necessary. Levaditi found that living treponemas placed in an Arsenobenzol solution continue to live, but are destroyed if a trace of liver extract be added.

If the drug has to be taken up and transformed by the liver to become toxic to the treponema, the best mode of use may be intestinal, since all the veins of the intestines join the portal vein.—Sabouraud, *La Clinique* (13/4/13).

The volume of Solution should be moderately small, *e.g.*, 160 Cc. Patients should abstain from taking liquids altogether for three days. Ten minutes after the injection Morphine is given hypodermically.

Chorea, two cases. Successive doses of 0·10, 0·20 and 0·40 Gm. pronounced improvement being visible in both cases. Injected in 100 Cc. of 0·5% Saline Solution with 5 or 10 drops of Tincture of Opium, and introduced as far as possible into the rectum by means of a long tube. The fluid must be retained for four hours. Satisfactory.—Pres., July 1913, 227.

Eight cases with well marked cutaneous manifestations treated. *Dose* from 0·4 to 1·4 Gm. Results absolutely *nil.* One patient had 1·3 Gm. (presumably *total*) given daily in Suppositories for 11 days with Neosalvarsan 0·3 Gm. by gluteal injection. This was effectual. —B.M.J.E. ii./12,84

[℞] Arsenobenzol Suppositories.

Arsenobenzol 0·1 Gm., Cocaine 0·1 Gm., Almond Oil *q.s.*, Theobroma Oil to 1·0 Gm. Not to be kept more than 48 hours. Coat with beeswax as protective.—Pres.

Supsalvs.—A proprietary brand of Suppositories containing each 0·1 (adult) and 0·03 Gm. (infants).

Diabetes mellitus successfully treated by Arsenobenzol Suppositories (Supsalvs), also by Novarsenobenzol intravenously.—F. J. W. Porter, L. ii./20,1051.

Combined Salvarsan and Mercurial Treatment.

Most specialists now supplement the treatment with Mercurial injections or inunctions.

Mercury possibly assists by promoting absorption of the small cell exudation which occurs in syphilis.—T. W. Gibbard, B.M.J. ii./12,955.

Royal Naval Hospital, Chatham, Results. 1,100 cases of syphilis treated by Salvarsan and Neosalvarsan and 2,500 injections. Of the cases receiving one injection 12·5% relapsed, and after two or more injections only 1·3%. In primary cases with negative Wassermann give at least two injections at 10 to 14 days interval or as soon as Arsenic is out of the urine by Marsh's test. Start three months' course of Mercury at the same time. In primary cases with + reaction, and in the secondary stage of less than a year's standing, three injections with one month's interval. For other cases see paper.—G. B. Scott, R.N., B.M.J. ii./13,1344.

In primary cases results with Arsenobenzol combined with Mercury better than those obtained before discovery of '606.' In the secondary period recurrences are just as frequent in patients treated with Arsenobenzol as in those treated without.—B.M.J.E. ii./13,4.

Two years experience with Salvarsan at the Seamen's Hospital, Greenwich. 350 injections of Salvarsan and 150 with Neosalvarsan. Amongst the males 6·2% were primary, 57·7% were secondary and 21·1 were tertiary (including parasyphilitic). Amongst females 0·8% were primary, 12·1% secondary and 2·1% tertiary (including parasyphilitic). The injections were invariably intravenous. A sharp needle essential to puncture the vein. Recommended to use freshly distilled water and autoclave it immediately for use. Reaction is less. It is also desirable to purge the patient the night before injection and withhold food to avert reaction symptoms—headache, diarrhœa and vomiting. In the majority of cases the number of injections did not exceed two of 0·6 Gm. The conclusion is that Salvarsan is preferred and that prudence dictates that in *every case the remedy should be supplemented by a course of Mercury.*—Sir Henry Morris and H. MacCormac, L. ii./13,1243.

The combined Arsenic and Mercurial treatment of Neisser is recommended. This consists in periodic intravenous injections of Salvarsan followed by a course of five intramuscular injections of Grey Oil or 30 inunctions.—**Venereal Diseases Roy. Com. Report.** B.M.J. i./16,346,380,Editorial 385.

War Office Method (Letter, May 8/16, No. 24/General/4912, A.M.D. 2):—

Course A.—During 52 days,

1st week	2 doses	Salvarsan (0·3 Gm.)	and	1	dose	of Mercury.
2nd ,,	1 dose	Salvarsan (0·3 Gm.)	,,	1	,,	of Mercury.
3rd ,,	1 ,,	Mercury (only).				
4th ,,	1 ,,	Salvarsan (0·4 Gm.)	,,	1	,,	of Mercury.
5th ,,	1 ,,	Salvarsan (0·5 Gm.)	,,	1	,,	of Mercury.
6th ,,	1 ,,	Salvarsan (0·5 Gm.)	,,	1	,,	of Mercury.
7th ,,	1 ,,	Salvarsan (0·5 Gm.)	,,	2	doses	of Mercury.

(*Recent* evidence is that single doses above 0·4 Gm. are not advised—W. H. M. *vide infra.*)

If the Wassermann Reaction is still positive—
Course B.—14 days on Potassium Iodide in 10 grain doses.
If still positive—

Course C.—Comprised of 11th to 13th week.—3 doses of Mercury; 1·2 Gm. of Salvarsan during 15 days.

Various kinds of mild and severe reactions are described. The main point brought out is that patients should be persuaded to continue treatment until all clinical signs have disappeared and blood reaction is negative. Primary sores, secondary rashes and condylomata disappear quickly, but in cases in which the mucous membrane of the mouth and tonsil are affected, and in glossitis, the effect is not so speedy.—Maj. Lloyd Jones & Capt. A. J. Gibson, B.M.J. i./17,152.

As a routine treatment for primary and secondary syphilis three injections of 0·6 Gm. in 200 Cc. Saline at fortnightly intervals with two weekly injections of mercurial cream in the intervals. This course is an intensive one designed to render a soldier fit for active service quickly. Kharsivan found to be every bit as potent as the original German preparation. Record of 600 injections.—H. C. Lucey, B.M.J. i./16,614.

Reinfection with syphilis, 28 cases. Treatment with Salvarsan and Mercury. Perhaps the only persons immune from syphilis are the syphilitics.—C. F. White, B.M.J. ii./17,509.

The necessity of associating intravenous injections of Arsenic with Mercurial treatment has been confirmed by the French Military Medical Service on the results of 95,000 injections of Arsenical compounds during the first two years of the war. There was no fatal case and few serious results.—P. Ravaut, Arch. Med. et de Pharm. Militaire, Nov. 1916. See also B.M.J. i./18,482.

If doses of 0·6 Gm. Arsenobenzol are repeated too frequently toxic effects are frequent, epileptiform convulsions coming on within 5 days, and often ending fatally. A recent German edict says a single dose must not exceed 0·4 Gm. Even 8 doses of 0·3 Gm. in 28 days with Mercury is unsatisfactory—*dermatitis and jaundice* follow. Both these are apt to be fatal. Two outbreaks of jaundice occurred in military hospitals in 1917—18.

A drink containing *Glucose* 2 ounces, given ½ hour before injection appears to reduce jaundice. An elaborate table of treatment to be spread over two years, as used at St. Thomas's, comprising either '606,' '914,' Sulfarsenol or Silver Salvarsan, with Mercury and Potassium Iodide is provided.—Col. L. W. Harrison, B.M.J. ii./22,1.

Local Anæsthetics.

Novocain injection—2 Cc. of 1% Solution has been advised before, and is said to render the injections painless. Ethyl chloride has also been used. Also Morphine in dose of 0·01 Gm. where pain is excessive with subcutaneous injections.

Injectio Salvarsan cum Novocain (Intramuscular).
Dose.—Salvarsan 0·3, Novocain 0·03, Normal Saline to 10 Cc.

This has been employed, but the pain caused may persist after the anæsthetic effect has passed off.—W. H. M.

Local Use.

For condylomata a powder containing Arsenobenzol as also a 50% Ointment strongly caustic when used in this manner and hence curative.

For milder effect a 10% Ointment in a mixture of equal parts Soft Paraffin and Lanolin is used.

Salvarsan in glossitis.—Swabbing with solution of 0·1 Gm. in water 30 minims and Glycerin ½ ounce was curative. At the end of a week ulcers diminished to quarter of original size.—A. Allport, B.M.J. ii./12,349.

Ordinary ulcers heal rapidly by local use of Salvarsan and Neosalvarsan as dusting powder.—H. Alston, B.M.J ii./12,1748.

INJECTION OF PATIENT'S SERUM REMOVED AFTER SALVARSAN TREATMENT.

THE TRANSMISSION OF *Sp. Pallidum* FROM THE BRAINS OF GENERAL PARALYTICS TO THE RABBIT AND THE EXPERIMENTAL PRODUCTION OF SYPHILITIC ENCEPHALITIS IN THIS ANIMAL (NOGUCHI'S EXPERIMENTS), led to the method of INTRATHECAL INJECTION OF PATIENTS SERUM after SALVARSAN TREATMENT. After intramuscular injection of Salvarsan and Mercury and intravenous injection of Neosalvarsan,—a case of gummatous meningo-encephalitis greatly improved, but improvement occurred in particular after an intrathecal injection of serum taken one hour after a further dose of Neosalvarsan—the action being evidently due to antibody formation (the Serum contained no Arsenic) and not to Arsenic —F. W. Mott, L. ii /13,1367 : B.M.J. ii./13,1269.

Swift's method of injecting the curative material (antibodies circulating in the blood) one hour after an injection. The blood is withdrawn, allowed to clot and the serum collected after heating to 60° C. to destroy complement (?), diluted with Normal Saline and injected into the spinal canal Emery says it is not antibody effect, but the effect of minute amounts of Salvarsan. Results striking.—L. i./14,230. See also M.P.C. i./14,401, and C. A. Ballance. L. i./14,1525,1550.

Intraspinal treatment of syphilis of the central nervous system (8 cases). Doses of 0·6 Gm. Salvarsan intravenously (this dose is now regarded as excessive) with subsequently the autosalvarsanised serum withdrawn 20 minutes after the Salvarsan and reinjected 8 hours or the day after. Results favourable.—A. Rocke Robertson, B.M.J. ii./16,483. *See also* A. G. Shera, Pr. Dec. 23, 417.

Neuro-syphilis. Defined as comprising only such nervous or mental symptoms as are actually due to the syphilitic organism or its toxin. It does not mean the mere presence of nervous or mental symptoms in a syphilitic patient. The treatment is Salvarsan combined with Mercury, but 0·6 Gm. of the former intravenously is now considered risky. It is safer to give not more than 0·3 Gm. in repeated doses. Salvarsanised serum (patient's own blood), or human, or horse serum, mercurialised *in vitro*, is suited for tabes and cerebro-spinal syphilis. Arsenobenzol given direct intraspinally into the cerebro-spinal fluid is dangerous.—Sir J. Purves-Stewart, B.M.J. ii./22,621. See also S. A. Kinnier Wilson *ibid* 628. See also D. K. Adams' "Treatment of Neurosyphilis with special reference to changes in the cerebro-spinal fluid." (Cell counts and Colloidal Gold reaction) *ibid* 630.

LYMPH OF ARSENIC EATERS (*e.g.* Styrians) suggested to treat syphilis by injection. Negatived on grounds *inter alia* that the blood of these people is not necessarily rich in Arsenic. Further, any Arsenic that is absorbed from the stomach and intestine is excreted in the urine.—B.M.J. ii./16,748.

After-effects.

Headache, numbness of the limbs, sickness, skin eruptions—urticaria and erythema. Effects on the eye; iritis. (A person with unsound eyes must not receive the injection). Pyrexia; sensory nerve complications; defects in hearing have been reported.

Remarks on Commercial Samples:

Early products (in this country) not so effective as the preparation of 1910, but they were found superior to '914.'—Col. L. W. Harrison, B.M. ii./21,944.

See also details under Novarsenobenzol.

With a British made Arsenobenzol in 600 cases, headache occurred in 17%, rigor 5%, vomiting in 7%, diarrhœa 10%, transient albuminuria 0·3%, Herxheimer's Reaction 2·3%, herpes labialis in 1 case, thrombosis 0·5%, dermatitis in 1 case.—H. C. Lucey, B.M.J. i./16,614.

Arsenic retention (especially with the intramuscular method) has resulted in death—*vide Vol II.*

Two fatal cases of icterus gravis following Novarsenobillon.—B.M.J.i./18, 448.

Jaundice occurs after arsenic compounds in syphilis. 115 cases in 7,000 patients.—Col. Bolam, B.M.J. i./19,489.

Jaundice during treatment of syphilis with Arsenobenzol. Evidence is that the arsenical is conducive to its production. It is more common with Neo than with the original.—R. Hallam, L. i./20,1356.

Delayed Arsenical poisoning from Arsenobenzol preparations. A report of 58 cases during last 18 months—8 fatal.—G. S. Strathey and co-workers, L. i./20,802.

Salvarsan, Mercury, Potassium Iodide and other drugs cannot with certainty destroy *Sp. pallida.*—H. C. French, L. ii./12,228.

Warnings and Contra-indications.

It should not be given to aged and infirm patients.

Idiosyncrasy to Arsenic in general may exist in the patient. If necessary try the effects of Fowler's Solution *per os.* Patients giving a positive reaction should not receive the injection.

If the injection be given on a full stomach or when blood pressure is high an alarming condition of feeble rapid pulse and collapse may supervene, which, however, usually passes off when vomiting occurs. A good purging night before and morning of the injection is advisable and no food or drink for some four hours before the infusion.—H. W. Bayly.—L. i./11, 153.

It is certain the drug can cause death. It is very unwise to inject a total of 1·2 *Gm.* (2 doses of 0·6 Gm.) within three days—a wider interval is important. Selection of case probably essential in the future.—L. i./12, 592.

The drug should not be given where there is a general exhaustion of vitality following the severity of the syphilitic poisoning, especially in persons already suffering from chronic organic diseases of the kidneys* and from chronic degenerations of the cardiac muscle, patients with definite atheroma of the arterial coats, such as have already suffered from anginal attacks or from signs of cerebral hæmorrhage, add to these, patients with diabetes, tabes dorsalis and general paretics, and lastly any case in which there is or has been recent endocarditis. Extreme caution is necessary in cases with signs of active pulmonary phthisis owing to the congestive action of the drug.—B.M.J.E. ii./13,7.

An acute generalised and universal dermatitis followed the use of a substitute for Neosalvarsan, then most extensive desquamation—large flakes of epidermis could be removed from the bed sheets in handfuls. Severe purulent conjunctivitis and intense photophobia, eyelashes and hair shed. Recovery after 12 weeks. Similar results from a dose of Salvarsan substitute. —J. E. Lane, L. i./15,725. Two further cases, *ibid* 934.

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* According to some authors, nephritis is *not* a contra-indication.

Salvarsan and the new substitutes are more toxic and at the same time more efficacious than the Neosalvarsan. Not in agreement with previous writer. —D. Watson, L. i./15,935.

One of Mr. Lane's cases terminated fatally. He puts it as follows :— A healthy young man contracts syphilis. He is given 2 intravenous injections of an Arsenobenzol substitute. He develops symptoms of arsenical poisoning, from which he dies one month later, and as to the diagnosis of the death there can unfortunately be no mistake. This surgeon has the experience of having given some thousands of injections of the original preparation without untoward symptoms.—L. i./15,990.

Acute angio-neurotic œdema due to.—R. F. G. Parnell, W. C. P. White and P. Fildes, L. ii./17,866.

Wassermann's Reaction, Effect on and other details. See Vol. II.

Post-Salvarsan jaundice.—A. T. Todd, L. i./21,632.

Calcium Chloride 10% solution in Salvarsan Poisoning given separately or with the injection prevents toxic symptoms.—B.M.J.E. i./22,94.

Risks of Arsenobenzol injections—Medical Research Council Report. Some degree of hepatic insufficiency demonstrable 3 months after a course—but the treatment thought justifiable.—L. ii./22,193.

FURTHER REFERENCES.

"Salvarsan," by M. and W., provides abstracts of the literature of the subject ranging from March 15 to December 17, 1910. These constitute everything of importance that was written on the subject up to that date. Further references are contained in the 15th, 16th and 17th Editions.

Streptococci in serum are killed by Salvarsan and Neo-Salvarsan in high dilution.—Sir A. E. Wright, L. ii./15,1012.

℗1 **Salvarsan Sodium** ('1026A' Ehrlich). *Dose*, 0·3 to 0·45 Gm. As much as 1 Gm. has been given. A yellow powder readily soluble in water (requires no alkali to dissolve it).—B.M.J. i./15,979.

Sodium Salvarsan seems, in its efficacy, to be between 'modern' 606 and 914.—Col. L. W. Harrison, B.M.J. ii./21,944.

℗1 ✱**Eparseno** "132" (T.M. 422653) is stated to be a stabilised solution of Arsenobenzol for painless injection (it is *only* to be used this way) in the treatment of syphilis, yaws, recurrent fever, etc. It is supplied in ampoules each containing 1 Cc. of solution, corresponding to 0·12 Gm. of Arsenobenzol or 0·25 Gm. of Novarsenobillon.

℗1 ✱**Stabilarsan** (Brit. Pat. 177283 of 1922, T.M. 411118.) A preparation of Arsenobenzol base with Glucose for injection, supplied in liquid form ready for use, either intravenously or intramuscularly, in ampoules.

Stabilarsan is based on the theory that a molcule of Arsenobenzol combines with two molecules of Glucose to form a definite chemical compound. This compound is stated to be relatively stable when exposed to the air. It is supplied in 50% Glucose solution. *Ampoules* contain 0·1, 0·15, 0·20, 0·30, 0·45, 0·6, 0·75 and 0·9 Gm.

In congenital syphilis the preparation is stated to be safe. For an infant 15 lbs. weight dose 0·075 Gm. (0·75 Cc. of the solution in the ampoule). For routine treatment of syphilis a course is given combined with Potassium Iodide on the lines of Arsenobenzol methods.

℗1 ✱**Sanogyl** (T.M. 421128). A tooth-paste to combat pyorrhœa; claimed to have a specific action on spirilla of the mouth, and to contain arsenobenzol. —P.J. ii./22,392.

We identified the presence of arsenic by the Marsh Test. There is insufficient to give a precipitate with H_2S after destroying organic matter.

℗1 Silver Salvarsan.

Dose.—Strictly intravenously, one or two injections of 0·1 Gm. each, proceeding to full doses of 0·2 Gm. for women and 0·25 Gm. for men at intervals of not less than 4 days. The latter are repeated at similar intervals until clinical symptoms are cured and Wassermann Reaction negative. In weakly patients begin with 0·05 or 0·075 Gm. Injections are 1% in sterile water, *e.g.* 0·1 Gm. in 10 Cc..

Manufacture.—Stated to be made by interaction of a silver salt with Arsenobenzol and conversion of the resulting body into the Di-sodium salt, containing 22·5% Arsenic and 14% Silver.

It is a brownish black powder, readily soluble in water, with alkaline reaction. Ampoules contain 0·05, 0·1, 0·15, 0·2, 0·25 and 0·3 Gm.

Clinically 0·1 to 0·3 Gm. corresponds to about 0·3 to 0·6 Gm. Novarsenobenzol. It is thought to have the combined effect of Arsenobenzol and Silver against syphilitic parasites. Mercury to be suspended during treatment.

An efficient spirochæticide with pronounced effect on visible syphilis lesions. Absence of characteristic and often nauseating garlic-like odour noticed by patients receiving Salvarsan intravenously—no authentic case of argyria reported.—H. E. Michelson and D. M. Siperstein, L. ii./21,571. See also B.M.J.E. ii./21,1,54.

In Germany used without Mercury to support it.—B.M.J.E. i./20,54.

Effective in early cases, comparatively inert in late.—Pres. July, 20,274.

Probably about twice as effective as '914' in similar doses.—Col. L. W. Harrison, B.M.J. ii./21,944.

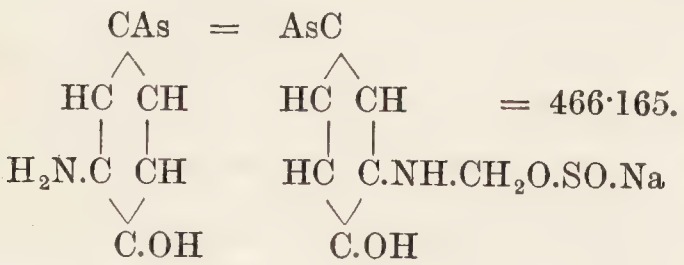
Late syphilis. Importance of thorough treatment in the first instance—to prevent late sequelæ. Sulfarsenol praised for use in myocarditis and aneurism. Tabes: Intravenous injections with deep subcutaneous injections. For intravenous use Silver Salvarsan and for subcutaneous Sulfarsenol. G.P.I.: Silver Salvarsan in large quantities.—Col. L. W. Harrison, L. i./23,4.

Contains Silver Oxide in complex form. It does not contain Colloidal Silver.—J.C.S.A. i./20,401.

The Silver is not combined with the Salvarsan in **Sodium-Silver Salvarsan** (another preparation) but is present merely in colloidal form.—W. H. Gray, P.J. i./23,216.

Silver Arsenobenzol inferior to Arsenobenzol and Novarsenobenzol in treatment of syphilis.—A. Strauss and co-workers, per Jl. Trop. Med., April 15/22,106.

P1 **Novarsenobenzol.** *Syn.* NEO-ARSENPHENOLAMINE, ✱NEO-KHARSIVAN (T.M. 364607), ✱**Neosalvarsan*** (No. 914 of Ehrlich's Series), ✱NOVARSENOBILLON (T.M. 413810), NOVARSENOL, ARSENO-BENZOL ACID SODIUM FORMALDEHYDE-SULPHOXYLATE, SODIUM DIOXYDIAMIDO-ARSENOBENZENE-METHANE SULPHONATE. P. Argent. II.



(Theoretical formula.)

Brit. Patent No 7865/12. Aqueous Solutions of Salvarsan and Formaldehyde Sulphoxylate give a precipitate which is soluble in a minute quantity of alkali to form an almost Neutral Solution. The product differs according to temperature employed. At ordinary temperature the precipitate contains one "Sulphur-Acid" group, at 60–70° it contains two "Sulphur-Acid" groups. See also Patent No. 8219/12. Licences to use these patents have been granted. See Arsenobenzol.

The compound contains 21% Arsenic approx.

*Trade Mark No. 340387 was suspended in favour of British Houses and suspension recently *revoked* (1923), *cf.* Arseno-benzol.

Report on Various Makes of Neosalvarsan. It appears that although the working details in the case of '606' in the patent specification are adequate, they are not so in the case of the '914' product. The composition of '914' differs widely from that suggested by the theoretical formula. The matter was left a good deal to individual manufacturers. The determination of the *therapeutic action* on mice infected with trypanosomes is a good index of activity, as it would be upon syphilis in man. It is in use in the **Medical Research Council's Department of Biological Standards** at Hampstead, in addition to the regular testing of every batch for absence of undue toxicity.—H. H. Dale and others, L. i./22,779.

For further details of the Standards adopted see Vol. II.

A yellow powder, readily soluble in water with neutral reaction. The compound changes in the air; it is hence issued in sealed ampoules. *Injections must be made immediately after preparation.*

Strength in comparison with Arsenobenzol.—It is 2/3 the strength.

Dose and Method of Use.—

Average single for men 0·6 to 0·9 Gm. (=0·4 to 0·6 Gm. of Arsenobenzol).

For women, 0·45 to 0·75 Gm. (= 0·3 to 0·5 Gm. of Arsenobenzol).

For children, according to age, 0·15 to 0·3 Gm. (= 0·1 to 0·2 Gm. of Arsenobenzol).

For infants, 0·05 Gm. (= 0·03 Gm. of Arsenobenzol).

Caution.—*Some of the recommendations by authorities latterly have been on the side of reducing single doses, vide remarks under Arsenobenzol. The average figures given above are as in our last edition—we repeat them with this proviso.*

Intramuscularly smaller doses suffice—0·45 Gm. is regarded as maximum by this route, vide infra.

Speaking generally, the dosage for this compound is identical with that of Arsenobenzol and for guide as to repetition of dose and course of treatment, the remarks under that heading apply here also.

The doses are given by the following procedures:—

Intravenous. *Concentrated*, 0·6 Gm. (average) in 10 Cc. sterile distilled water (not saline).

Dilute, 0·6 Gm. in 100 to 120 Cc. water; or for 0·3 or 0·45 Gm. in 40 to 50 Cc. water (not saline).

Intramuscular. The absorption is slower, so it is probable that smaller doses suffice than by the intravenous method.

0·45 Gm. may be regarded as the maximum. This should be dissolved in a mixture of **Guaiacol-Glucose** and water 10 to 20 minims, for injection into the buttock. The part should be massaged after injection. It is not given subcutaneously.

Guaiacol-Glucose Sterules 2 Cc. for preparing the intramuscular injection are made of the strength, Guaiacol 1, Glucose 50, Sterile Water to 100.

This method of procedure was advocated by T. Anwyl-Davies, L. ii./18,757. It was found painless. Even 0·75 Gm. will dissolve in 10 to 20 minims.

℗ ✱ **Glucarsenol** (T.M. 382195) is a solution in Glucose, Guaiacol and Water with addition of Stovaine. The Glucose may, to some extent, prevent oxidation.—L. ii./18,96.

Uses.—As for Arsenobenzol. It is said to be better tolerated.

Contraindicated as for Arsenobenzol, *q.v.*

References.

Large doses given. 1·2 Gm. every eight days for a month without ill effect, but this amount is warned against.—Brevet Lieut.-Col. T. W. Gibbard and Maj. L. W. Harrison.—B.M.J. ii./12,954.

Experience with Neosalvarsan and Salvarsan at the Seamen's Hospital The Compound may be dissolved in water or 0·4% Saline Solution for intravenous use. The water must be cold and the Solution used at once.—Sir Henry Morris and H. MacCormac.—L. ii./13,1243.

For an exhaustive abstract of the last communication see Combined Salvarsan and Mercury.

Suggestion to use the Neo-and Arsenobenzol Solutions *concentrated*, from 1 to 6% being used, with advantages claimed—reactions diminished, shorter time of injection, elimination slower. Concentrated Novarsenobenzol Solutions can be given intravenously, but not the Salvarsan.—B.M.J. ii./13,1505.

Rat-bite fever, a case of in India, treated by 0·7 Gm. of Neosalvarsan, subsequently by Metharsinate of Soda *per os*. Hata mentions 8 cases. Treatment in other cases—Methylene Blue, Quinine, Arsenic, Mercury and Salol dissolved in Olive Oil for the roseolar eruption.—L. ii./13,1764.

In general paralysis marked cerebral improvement from small intravenous injections.—B.M.J.E. ii./13,40.

Typhus fever treated intravenously. In two cases the course of the disease was aborted.—Glas. Med. Jl., Nov. 1913,376.

Tuberculosis treated with.—L. i./14,1602.

Blood pressure is generally lowered by Neosalvarsan intravenously; it is certainly not increased.—H. D. Rolleston, B.M.J. ii./15,281.

Neo-Salvarsan or Novarsenobillon *subcutaneously* influences syphilitic lesions *more rapidly than intravenous doses of* Salvarsan or Arsenobillon. Experience of 1,500 subcutaneous or intramuscular injections of Neo-Salvarsan. Numerous methods were tried and are described, the best being to dissolve the Neo- (0·6 Gm.) in 1 Cc. of a 4% Stovaine solution and make up to 2 Cc. with a **Creo-Camph Cream** melting at 15° C. which is stated to be a 'special' formula, **Campho-Phenique** instead of Creo-Camph. also used with encouraging result. Morphine ⅓ grain is required to overcome pain. The injection is made about a point three finger breadths below the crest of the ileum on a line joining the tuber ischii with a point on the crest of the ileum which is perpendicularly above the great trochanter when the patient is upright—L. W. Harrison, C. F. White and C. H. Mills.—B.M.J. i./17,569.

Novarsenobillon ('914') in syphilis of the central nervous system safe and most efficient.—H. Carlill, L. i./18,243.

Novarsenol intravenously in syphilis. Course of 6.15 Gm. spread over 80 days with Mercurial Cream in addition.—H. W. Abbot, L i./18,307.

Severe dermatitis from Novarsenobillon.—L. G. Leonard, B.M.J. ii./19,773

ANTE-NATAL TREATMENT OF CONGENITAL SYPHILIS. The focus of infecting spirochætes is probably the placental tissue. Arsenical compounds and Mercury at Glasgow given with 100% successes.—J. R. C. Greenlees, B.M.J. ii./21,654.

Four or five intravenous injections of Neosalvarsan with Mercurial inunctions during pregnancy. Results good. A resolution for notification.—B.M.J. ii./21,654,887.

Disseminated sclerosis, early cases treated with Novarsenobillon. Six weekly intravenous injections (0·15, 0·3, 0·45, 0·45, 0·6, 0·6 Gm.) repeated at end of six months, with Arsenic *per os* in the interval.—W. Johnson, L. i./23,1209.

TRYPANOSOMIASIS.—Intravenous injection of Arsenical compounds, and an immediate subsequent attempt to sterilise the central nervous system by intrathecal injection of Salvarsanised Serum. The patient's treatment is complete in 2 days. Comparative tables of a variety of procedures. A dose of Neo-Kharsivan with 1 injection intrathecal serum gave a large percentage 'alive and well.'—C. H. Marshall and S. M. Vassallo (Uganda), B.M.J. i./21,773; i./23,231.

In trypanosomiasis, drugs injected into the circulation, though they may sterilise the blood, probably do not reach the parasites in the central nervous system as the trypanosomes damage the choroid plexus and so prevent passage of drugs into the cerebo-spinal fluid. Neo-Kharsivan injected into a vein and 3 hours later withdraw 3 ounces of the patient's blood. 20 minims of the serum is then injected into the spinal canal. Results so far (since 1918) promising. —Sir T. Clifford Allbutt quoting Marshall of Uganda, B.M.J. ii./21,181.

Marshall and Vassallo produced no satisfactory evidence that intrathecal injections of Salvarsanised Serum sterilise infected cerebro-spinal fluids (in trypanosomiasis).—Prof. Warrington Yorke, L. ii./21,973,1077.

Death 111 days after the last of seven injections of a course of Neosalvarsan treatment.—D. R. C. Shepherd, L. ii./21,1273. A rough estimate of the Arsenic in the body *post mortem*, by Maj. Elliott, showed that nearly one-tenth of the total Arsenic given remained in the body.

Gastric syphilis treated by Mercury and Arsenobenzol.—D. J. Galloway, B.M.J. i./22,217.

YAWS, acute, generally cured within 3 days by one injection of Novarsenobillon or Galyl.—F. T. Auden, B.M.J. ii./22,83.

Soft chancres treated by swabbing with 3% solution.—B.M.J.E. ii./22,18.

Glucose, 30 Cc. of 30% solution, given intravenously in conjunction with even small dose of Neosalvarsan increases efficacy.—B.M.J.E. i./22,17.

Cysts of *Giardia intestinalis*, *Chilomastix mesnili*, *E. Coli*, *E. histolytica*, and *E. nana* rapidly disappeared from stools of a man, following intravenous injections of Neo-arsphenamin. Whether results were permanent has yet to be determined.—Carr and Chandler, T.D.B. Vol. 17, 1921,99.

Malaria treated with conflicting results. Sodium Cacodylate recommended as an adjuvant to Quinine.—W. A. Murray, T.D.B. Vol. 17, 1921,142.

Broncho-spirochætosis in China. Immediate relief; recovery after second or third administration.—E. C. Faust, Jl. Trop. M., Jan. 1/23,14.

Guinea-worm. Novarsenobillon, 0·6 Gm. is the best treatment.—N. Cantlie, Jl. Trop. Med., Feb. 1/23,39.

Massive doses given *intrarectally* in cases where intravenous injections are dangerous or undesirable. As much as 4 Gm., it is stated, may be given with safety.—H. G. Mehrtens, per Jl. Trop. Med., Nov. 1/22,348.

Hemiplegia cured in 3 weeks by intravenous injections of 0·3 to 0·9 Gm.. —L. Le Dentu, per Jl. Trop. Med., Oct.1/23,312.

℗ **Novarsenobenzol Suppositories** (0·10 Gm. in cocoa butter) given to three month's old baby with hereditary syphilis, with good results.—E. G. Melon, per Jl. Trop. Med., Oct. 16/22,334.

℗ **Salvarsan Copper.**—A new combination.
Dose.—0·1 Gm. In framboesia and malaria.—B.M.J.E. ii./14,12.

℗ Sulfarsenol.

Dose.—The preparation can be given *hypodermically* or *intramuscularly* in fairly concentrated condition. The following is suggested as a course in primary syphilis for an average adult:—

	Water.
1st day 0·12 to 0·18 Gm.	in 2 to 3 Cc.
3rd ,, 0·18 ,, 0.3 Gm.	,, 3 ,, 5 ,,
5th ,, 0·30 ,, 0.42 Gm.	,, 5 ,, 7 ,,
8th ,, 0·42 ,, 0.6 Gm.	,, 7 ,, 10 ,,
13th ,, 0·48 ,, 0.6 Gm.	,, 8 ,, 10 ,,
19th day 0·54 to 0·6 Gm.	in 8 to 10 Cc.
25th ,, 0·6 Gm.	,, 10 ,,
40th ,, and later, Wasserman	
40th to 60th day, Arrhenal.	
61st day, New Series of injections of Sulfarsenol.	

The preparation is also given intravenously, starting with 0·06 Gm., proceeding with caution (see also Col. L. W. Harrison, *infra*).

Chemical Composition. According to the graphic formula attributed to it by the makers, this substance is the same as Novarsenobenzol (*q.v.*), excepting that it has two Sodium Mono-menthane Sulphonate radicals, instead of one, *i.e.*, $NH.CH_2O.SO.Na$ occurs in place of NH_2 in the formula. The preparation is supplied commercially in a large range of doses.

It is stated that this is the only Arsenobenzol compound on the market, which can be given into the muscles or subcutaneous tissue without causing great pain. Intramuscular or subcutaneous treatment of syphilis with Arsenobenzol preparations in general said to be better than intravenous.—F. C. Doble, L. ii./20,243. Also used in complications of gonorrhœa, arthritis, rheumatism, hyperkeratosis and epididimytis (especially good in the last mentioned).—L. i./23,70. See also W. M. Browdy, *ibid* 158. (Doble uses only 8 to 10 minims of water for 0·2 to 0·6 Gm. injected into the forearm).

Congenital syphilis treated. Its intramuscular injection not so efficacious as Kharvisan intravenously.—E. Crawford and G. B. Fleming, L. ii./21,700.

Good results from Sulfarsenol. It can *not* be recommended for intravenous use. Given subcutaneously, it offers a hope of treating syphilis over long periods without toxic effects.—Col. L. W. Harrison, B.M.J. ii./21,944.

After 3 injections of the drug in the treatment of yaws in a child of 6 an eruption of herpes zoster appeared—possibly due to the Arsenic.—H. Coppin, per Jl. Trop. Med., May 1/23,140.

In gonorrhœal arthritis said to 'act like a charm.'—*Dose*, **0·12Gm:** followed in 2 days by **0·18Gm:** intravenously; three injections usually sufficient.—F. C. Doble, L. i./23,1315.

℗ **Sodii Benzo-sulpho-*p*-aminophenylarsonas.** *Syn.* HECTINE.

$$C_6H_5.SO_2.NH.C_6H_4.As\begin{matrix}OH\\ =O\\ ONa\end{matrix} = 379{\cdot}176.$$

Ampoules 'A' contain 0·1 Gm. in 1 Cc.—for 15 to 30 daily intragluteal injections. Ampoules 'B' contain 0·2 Gm. in 1 Cc. for more advanced cases. **Pills** contain 0·1 Gm. One or two daily for 10 days. **Drops.**—20 drops contain 0·05 Gm. *Dose.*—20 drops a day, during the first 4 days; 40 to 100 drops daily, during the following 10 days.

Colourless needles containing 19·75% Arsenic approximately. Very soluble in water. Solutions can be sterilised without decomposing.

Syphilis is a purely local infection during the 42 days of incubation. A thorough local treatment ought, therefore, to nip it in the bud. Daily injections of 0·2 Gm. in one Cc. distilled water are made in the neighbourhood of the chancre for 30 days. The result is complete destruction of the organisms in the initial lesion. To reach those that may have got into the circulation, Hallopeau advocates 20 gluteal subcutaneous injections of mercury benzoate (2 Cc. of a 1% solution) in addition to the local treatment. The success of the author's method is, he says, invariable, and acquired syphilis can be aborted in 30 days. H. Hallopeau, Interstate Med. Jl., Jan., 1911, per Pres., see also Major French, R.A.M.C., L. ii./11,1385.

As much as 10 Gm. has been given spread over two months.—F. N., 1911.

Intractable syphilis treated by Hectine 10 subcutaneous injections of 0·2 Gm., the first three on alternate days followed by 7 daily. Improvement in weight.—E. G. French & C. H. Wills, L. i./15,1338

Petrini-Galatz gave 0·2 Gm. daily intramuscularly, the total amount being 3 to 4 Gm. and in one case 5 Gm. Lesions healed. No symptoms of intolerance. Good results in primary, secondary or tertiary and hereditary forms of syphilis. Less complicated than Salvarsan injections. Cases should finally receive Mercury and Iodide.—V. Dudumi, Coltzea Hospital, Bucharest.

℗ **Hectargyre.** A preparation described as a mercurial salt of Hectine, for treatment of syphilis. Stated to be more rapid than any other mercurial agent. ℗ **Ampoules** 'A' contain Hectine 0·1 Gm., Mercury oxycyanide

0·01 Gm. in 1 Cc. 'B' contain Hectine 0·2 Gm., Mercury Oxycyanide 0·015 Gm. in 1 Cc.—one to be injected daily intramuscularly or intravenously, not subcutaneously. Ⓐ Ⓟ1 **Pills** contain Hectine 0·1 Gm., Protoiodide of Mercury 0·01 Gm. and Opium Extract 0·01 Gm. *Dose.*—2 pills daily for 12 *to* 15 *days*, 10 to 15 comprising the course.

Ⓟ1 **Kinectine.** A compound of Hectine with Quinine—*i.e.*, Benzo-sulphon-para-amino-phenyl-arsenate of Quinine. *Tablets* are made. Dose.—Three daily, one in the morning and two at night. *Use.*—As a prophylactic against and curative of hay fever, influenza and acute coryza.

Ⓟ1 ***p*-Amino-phenylarsonic-Toluene-Sulphonate.** $C_6H_4CH_3$ $(p)SO_2NH.C_6H_4AsO_3H_2$ is analogous with the acid of Hectine. Morgan and Mickelthwait made it by the Schotten and Baumann reaction by condensing *p*-Toluene Sulphone Chloride with Sodium Arsanilate. It should have properties analogous with Hectine.

Ⓟ1 ***Galyl.** (T.M. 362590). *Syn.* TETRAOXY-DIPHOSPHAMINO-DIARSENOBENZENE. $C_{24}H_{22}O_8N_4P_2As_4 = 856·248$.

The compound is issued in the form of the Sodium Salt, both in a 'Concentrated' and 'Dilute' form. It is stated that the 'Concentrated' form gives more of a *general* reaction than the 'Dilute,' and the 'Dilute' more of a *local* reaction than the 'Concentrated.'

Dose of both 'Concentrated' and 'Dilute' forms :—

For *males*, average 0·3 to 0·35 Gm., as first dose. Subsequent doses 0·35 to 0·4 Gm.

For *females*, average first dose 0·25 to 0·3 Gm. Subsequent doses 0·3 to 0.35 Gm.

Sodium Carbonate solution ampoules, 10 Cc. are available for dissolving the substance when given in the 'Concentrated' form. Doses are usually given intravenously every 6 or 8 days with a total of 1·4 to 1·6 Gm. The preparation is stated to have marked effect in syphilis—chancres healed in 2 to 12 days. Has a powerful action also on trypanosomes.

When given intramuscularly it is employed in the lumbar region. Rise in temperature, diarrhœa, and occasionally vomiting may be expected.

Yellowish powder *soluble* readily in water on addition of Sodium Carbonate. Contains 35·3% Arsenium ('606' contains 31·6%), and 7·2% Phosphorus. Sterilisable and does not coagulate albumin.

Contraindications.—As for Novarsenobenzol.

The *Royal Commission on Venereal Diseases* reported favourably on its use.

Cancrum oris in a child of 3 treated by Galyl, 0·06 Gm. intravenously repeated intramuscularly—after surgical treatment.—B. A. Peters, B.M.J. i./16,719.

Use at Royal Naval Hospital, comparisons with Neosalvarsan. Good results.—S. F. Dudley, L. ii./16,59

1000 intravenous injections. No fatality has yet occurred with Galyl. Urticaria and erythema have, however, been seen.—H. Spence, L. ii./15,1292.

Nine cases treated intravenously 0·3 to 0·4 Gm.—no ill effects. 0·5 Gm. produced disturbance of the pulse and heart.—A. Foerster, L. ii./15,645.

In disseminated sclerosis, Galyl in concentrated form intravenously, followed by Mercury intramuscularly, gave good result.—J. R. Perdrau and G. F. Stebbing, L. i./21,271.

Ⓟ1 **Bayer '205'** is probably a patented derivative of the type :—

$$\left[(SO_3H)_2.\ OH.\ C_{16}H_4NH.\ CO.\ C_6H_4.\ NH.\ CO.\ C_6H_4.\ NH\right]_2CO$$

Dose.—The injection is best made intravenously in dose of 1 Gm. in 10 Cc. of water at a time, but may also be given with safety subcutaneously.

The compound is a white powder, freely soluble in water, which can be sterilised.

A series of dyes containing Amino-naphthalene-sulphonic Acid were found to have active trypanocidal properties. A single dose of 3 mgr. is stated to produce immunity in a mouse to trypanosomiasis for weeks or months. Therapeutically it has been successful where Antimony, Arsenic and Emetine have failed. In a case recorded, four doses, making a total of 3·5 Gm., were given.

Germany appreciates the value of pharmacological research—we do not. A compound like this is thought by the Germans to be the key to tropical Africa, and consequently to all the colonies. —B.M.J. ii./22,569.

The compound exerts a remarkable action on *T. brucei*, *T. equinum*, *T. rhodesiense*, *T. gambiense*, but has not the same effect on *T. lewisi* or *T. cruzi*.

From experiments, the ratio of the minimal therapeutic dose to the minimal tolerated dose was found to be 1 : 60. It was possible to give as much as 0·5 Gm. per kilo body weight without causing death of mice (infected with *T. equiperdum*). It would, hence, be safe to assume 0·36 Gm. would be easily tolerated by man. Details of nine cases of trypanosomiasis treated. As much as 12 Gm. within 14 days have been given intravenously. Seven of the cases apparently cured.—G. C. Low and P. Manson-Bahr, L. ii./22,1265.

It is stated to have a direct action on trypanosomes whether given subcutaneously, intravenously or *per os*; also that it has prophylactic power. —Mayer and Zeiss, quoted, L. ii./21,573.

Bayer '205' on *T. equiperdum* in infected mice (quoted above).—C. M. Wenyon, B.M.J. ii./21,746.

German expedition, financed by German commercial firms, on its way to Rhodesia, under the auspices of our Colonial Office, to test the substance, with the aid of our medical officers in the Colony.—Remarks on the project. —E. T. Jensen, Trop. Dis. Prev. Assn., B.M.J. ii./21,814; L. ii./21,1025.

Search for specific remedies—brought about by intensive study of the phenomena of immunity to infection. Nature produces her own remedies for certain infections. Antibodies were found to be specific in two senses —they were indifferent to other kinds of infecting organisms or bacterial toxins, and, more important, they were harmless to the body itself. Would it be possible to employ synthetic chemicals to construct artificial substances of known chemical composition, which, like the natural antibody would combine with the protoplasm of the infecting parasite in preference to the body cells of the host?

Then follows a eulogy of Ehrlich and '205' against trypanosomes. The substance has a drawback. It is energetic on the kidneys. Whether the damage is permanent is not yet known, but life with kidney impairment is thought preferable to death from trypanosomiasis.—Quoting a lecture by H. H. Dale, B.M.J. i./22,807; L. i./22,1010.

It was found that the dye becomes attached to the proteins in the blood serum, especially to the albumins; albumin-free 'ultra-filtrate' from the serum was found devoid of the remedy. It is excreted unchanged in the urine.—Leader, L. ii./22,1286.

Therapia Sterilisans Magna, though desirable, is probably as unattainable in human trypanosomiasis as in syphilis. The best effect seemed to be obtained by giving the first 3 injections at close intervals, and spacing out the remainder into 1 Gm. doses once a week. The effects on the kidneys need not be regarded as contraindicating its further use.—P. Manson-Bahr. Records of nine cases of trypanosomiasis in Europeans treated with Bayer '205.'—G. C. Low, B.M.J. i./23,149.

As much as 5 Gm. have been given intravenously in 50 hours to a native. —N. H. Dyce Sharp (West African Med. Service), L. i./23,1026.

Six cases of trypanosomiasis in man treated by F. W. Kleine and W. Fischer.

Dose, 1 to 1·5 Gm., subcutaneously or intravenously, repeated once or twice at moderate intervals. If given in smaller doses the organisms may lose their susceptibility to the drug.—B.M.J. i./23,36. See also J. W. Stephens and Warrington Yorke, Jl. Trop. Med., Feb. 15/23,65.

Kala-azar treated with success; dose gradually increased up to 1 Gm.—no ill effect. Mollow's case (1922) in which 0·2 Gm. was disastrous is referred to.—Warrington Yorke, B.M.J. i./23,370. Two fatal cases.—J. T. Duncan and P. H. Manson-Bahr, Trans. Roy. Soc. Trop. Med. Vol. 17, 400. A failure.—L. E. Napier, per Jl. Trop. Med. Nov. 15/23,348.

A case of trypanosomiasis in the Belgian Congo—resistant to other forms of treatment—progressing well under Bayer '205.'—J. David, per Jl. Trop. Med., May 1/23,149.

We have observed conflicting statements of the action of Bayer '205' on trypanosomes *in vitro*. One writer records no marked harmful action, whereas another states that after subjection to the drug for 1½ hours trypanosomes no longer produce infection. The action of the drug *in vivo* is to prevent reproduction.—*cf.* T.D.B., 17/21,334,335.

Chemically, this compound should not be among the Organic Arsenic bodies; we include it here by reason of its trypanocidal properties. It has a chemotherapeutic index 1:60 (Atoxyl 1: 2). It is probably a derivative of Naphthylamine-Sulphonic Acid.—Barger, per Pres. Apl., '23,155.

"**No. 309**," produced in France, has similar properties and trypanocidal action, and is probably identical chemically. According to description the product should be $\left[C_{10}H_4(SO_3Na)_3NH.CO.C_6H_3\cdot(CH_3)NH.CO.C_6H_4.NH\right]_2CO$.—C.D. Mar 29/24,451.

℗ **Tryparsamide.** SODIUM-*n*-PHENYL-GLYCINAMIDE-*p*-ARSONATE.

$H_2N.CO.CH_2.NH(C_6H_4)As.ONa : O.OH$.

A derivative of Atoxyl having *pentavalent* Arsenic in its molecule, with low toxicity for animals—*e.g.*, the minimal lethal dose for mice on intravenous injection was over 2 Gm. per kilo, which is about 1/20 the toxicity of Salvarsan. Sleeping sickness cases have been treated with it—about 2 Gm. was found to be efficient andsa fe intravenous dose, although as high as 7 Gm. were given.—Jacobs and Heidelberger; Brown and Pearce, B.M.J. ii./22, 1183. See also Miss Pearce, Jl. Trop. Med., Feb. 15/23,70.

TRYPANOSOMIASIS. 40 cases in the Belgian Congo treated with it. A course of eight weekly intravenous injections was given, each injection in a solution made with boiled rain water of a concentration equal to 3 Gm. in 10 Cc. The maximum tolerated dose should not exceed 4 Gm. a week. Removes trypanosomes from the cell content of even the most advanced cases.—C. C. Chesterman, B.M.J. i./23,149.

Dr. Louise Pearce writes that it is incorrect to state (as Marshall and Vassallo had) that she had advocated local or intrathecal injection of the compound in sleeping sickness.—B.M.J. i./23,883.

For a Table showing Formula, Arsenic Content and Solubility of most of the Arsenic Compounds dealt with in the preceding pages, see Vol. II.

W. H. Martindale's paper on Organic Arsenic to the Int. Cong., 1909, *see Vol. II.*

℗ ATROPINA. FR. CX.

$C_{17}H_{23}NO_3 = 289·277$.

℗ "*Atropine and its Salts and their preparations.*"—See Note to Guttæ Atropinæ Sulphatis.

Dose.—$\frac{1}{200}$ to $\frac{1}{100}$ grain (**0·0003 to 0·0006 Gm.**), increased to $\frac{1}{16}$, or in acute mania to $\frac{1}{8}$ grain or more. FR. CX.—*Maximum dose* in 24 hours 0·001 Gm. ($\frac{1}{64}$ grain) approx.—is generally given internally as sulphate.

An alkaloid obtained from *Atropa Belladonna*, and other solanaceous plants. Generally in acicular crystals, alkaline in reaction.

Soluble.—1 in 560 of water, 1 in 3 of 90% alcohol, 1 in 36 of ether (Fr. Cx. 1 in 25), 1 in 1 of chloroform, 1 in 40 of olive oil, freely soluble in glycerin and oleic acid. Melts (*Off.*) at 114·5° to 115·5° C. Presence of hyoscyamine lowers M. pt.

Incompatible with caustic alkalis and mercurial salts.

Solutions of Atropine Salts left for several hours with Ammonia or Alkali Carbonate and to some extent Bicarbonate, are liable to saponification, forming tropine and tropate.—D. B. Dott, P.J. ii./21,286.

The mydriatic alkaloids, Atropine and Hyoscyamine may be manufactured from *Atropa Belladonna, Datura Stramonium, Duboisia myoporoides* and *Hyoscyamus niger*, and Hyoscine may be obtained from the last two plants. Atropine does not exist as such to any great extent in these plants, but is produced from the Hyoscyamine (its isomer) by the action of Alkali which is used in the manufacture.

Prior to the war derived from Central Europe. It is now being made from Egyptian Henbane in this country in larger quantities. The use of this plant tends to render the cultivation of other Solanaceous drugs a matter of indifference. The amount of the Egyptian available is very considerable.—F. A. Hocking.

By the action of baryta water both Atropine and Hyoscyamine split up into Tropic Acid and Tropine: it is, in fact, **Tropyl Tropate.**

Atropine is to all intents an intimate mechanical mixture of *d.*-and *l.* hyoscyamines which differ in physiological effect. The purest Atropine contains these two constituents in almost precisely equal quantities. This is not the case in the solanaceous alkaloids. Cushny showed that 0·045 mgr. *l.*-Hyoscyamine had the same optic effect as 0·55 mgr. of *d.*-Hyoscyamine, hence the variety *l.* has 12 times the strength of the latter. A sample of Egyptian Henbane (*H. muticus*) yielded at least 83% of its alkaloids as *l.*-Hyoscyamine. 0·5% solutions of this are equal to 2% solutions of Atropine for ophthalmic purposes.—H. R. Jensen, L. ii./16,797.

Tropine may also be combined with other acids such as salicylic or mandelic acid to form salts. These salts when treated with diluted hydrochloric acid form a class of artificial alkaloids, to which the generic name of *tropeines* is given. One of these made from the mandelate of tropine is **Homatropine** or oxytoluyltropeine (*q.v.*)

Antidotes.—Stomach pump and emetics followed by stimulants, hot coffee, morphine hypodermically ⅓ grain every two hours or pilocarpine nitrate ½ grain, hypodermically. Electricity, heat, and artificial respiration.

Pharmacological antagonism between Atropine and Pilocarpine appears to depend on mass action rather than upon actual amounts injected into the animals.—A. R. Cushny, Jl. Ph. Exp. Therap., 1915, 6, p. 439.

Atropine Sulphate 0·02 Gm. in 1% solution (2 Cc.) given in error *intravenously* instead of Tartar Emetic to a bilharzia patient. No antidote was given yet the patient was not seriously affected.—W. B. Haddad, L. i./22,155.

Uses.—Atropine and its salts are used for ophthalmic purposes to dilate the pupil and paralyse accommodation.

Given internally or hypodermically, they are antagonistic to opium and morphine, Calabar bean and physostigmine, jaborandi and pilocarpine, aconite and aconitine, and hydrocyanic acid. Physiologically, whilst Atropine acts as a "stimulant" to a large part of the central nervous system, it paralyses many of the nerves. It lessens the perspiration, especially the night sweats of phthisis, and

has been thought to stop the flow of milk and saliva, most of the secretions, but not the amount of the urine.

It is also injected to relieve pain in sciatica and is given to check bed wetting, and to relieve spasm of pain of urinary calculus, cystitis, and prostatitis. Relieves bronchial spasm, whooping cough and asthma.

Hypodermically prior to chloroform it is of value as an antidote to the cardio-inhibitory effects of the anæsthetic.

To diminish gastric secretion give Atropine in small dose in a large volume of water, on an empty stomach. Experimental proof.—T. Izod Bennett, B.M.J. i./23,366.

Typhoid Diagnostic, vide Vol. II.

Gas Poisoning.—Animal experiments (rabbits) showed that doses by injection of 2·5 mgr. to 4 mgr. were most satisfactory.

Its administration tends to cure inebriety.—Owen Lankester, B.M.J. ii./05,106.

McBride's hypodermic injection treatment for inebriety :—

First week, Atropine $\frac{1}{100}$ grain, with Strychnine $\frac{1}{60}$ grain *t i.d.*
Second ,, ,, $\frac{1}{60}$,, ,, ,, $\frac{1}{30}$,, ,,
Third ,, ,, $\frac{1}{50}$,, ,, ,, $\frac{1}{30}$,, ,,
Fourth ,, ,, $\frac{1}{100}$, *sine* Strychnina.

together with a mixture of Cinchona Extract, Sal Volatile, and Spirit of Chloroform thrice daily. A little Capsicum may also be added.

℗ **Mistura Antidipsomania Form No. 2:**

Dose.—½ ounce (**15 Cc.**).

Concentrated Liquors of Commerce of Cinchona and Gentian 10 minims, of Capsicum ½ minim, Solution of Strychnine Nitrate (4 grains to the ounce) 1 minim, of Atropine Sulphate (1 grain to the ounce) 1 minim, Glycerin 1 drachm, Water to ½ ounce, has been found of great value with the Strychnine and Atropine injections, gradually diminished in strength.

In the knowledge of the writers Liquor Strychninæ and Liquor Atropinæ Sulphatis up to 8 minims respectively internally and then gradually reducing, together with a cinchonine tonic worked wonders.

For further Inebriety Treatment see p. 127.

References to use of Atropine and its Salts.

In acute mania causes sleep in dose of ¼ to 1 grain of sulphate.—R.

Sea-sickness. It has been suggested to treat by paralysing the accommodation of one eye only with one drop of atropine solution, 4 grains to the ounce daily. Injection of somewhat large doses, $\frac{1}{64}$ grain for males and $\frac{1}{8}$ grain for females, relieve sea sickness.—L. i./14,49.

Iritis is to be treated locally by dilating the pupil and keeping it dilated. Henderson uses Atropine 1% with Cocaine 0·5% Ointment for the first three days every four hours. Then the Cocaine is eliminated, Atropine being used alone three or four times a day. Hot fomentations and leeches to temple beneficial.—B.M.J. i./09,1221.

Cholera successfully treated by hypodermic injection of Atropine. Originally advised by Sir L. Brunton to lessen vomiting. $\frac{1}{100}$ grain doses tried morning and evening. Results of value.—Sir L. Rogers, L. ii./15,222.

Will abort a cold in dose of $\frac{1}{150}$ to $\frac{1}{80}$ grain (Sulphate), to be dissolved in a tumbler of water and the whole sipped in the course of an hour, to be repeated next day if necessary.

Hæmostatic action is obtainable from full doses of Atropine with development of toxic symptoms,—dry mouth, flushed face, and dilated pupil. Suc-

cessful in active and passive arterial and capillary, traumatic and hæmophilic forms of bleeding.—Waugh.

In pulmonary hæmorrhage in tuberculosis Atropine Sulphate $\frac{1}{100}$ grain hypodermically at intervals of 4 or 2 hours according to circumstances,—acts no doubt by lowering pressure in pulmonary vessels.—J. W. Allen, Glas. Med. Jl., Nov. 1913.

Cardiac depression in diphtheria treated by Atropine Sulphate $\frac{1}{100}$ grain, Strychnine Hydrochloride $\frac{1}{100}$ grain, Adrenalin Solution (1 in 1,000) 5 minims, Water to 10 minims, hypodermically every four hours.—B.M.J. i./12,535.

In tuberculosis Atropine in doses of $\frac{1}{100}$ to $\frac{1}{50}$ gr. at bedtime makes sweating impossible.—Dixon, Pr. xc., 1.

Epididymitis prevented by hypodermic or Suppository use (1/75 grain in each) of Atropine. Useful in treatment of gonorrhœa.—W. Harrison and C. H. Heald, from a Military Hospital Report.

Heart Block.—In cases of high degree not due to organic causes, *Atropine* is often effective in reducing the block. Not successful in cases of complete organic block, nor does it appear to lessen either frequency or severity of the syncopal attack. Antisyphilitic treatment (Mercury, Potassium Iodide, Salvarsan) has been extensively tried in view of the fact that many cases of block are due to gumma of the bundle—results on the whole disappointing. —Pr., Nov. 12/655.

In *seasickness* Atropine hypodermically 1/50 to 1/30 grain. As preventive 1/60 grain on embarking is efficacious.—Pres., May, 1920.

Migraine well treated by Liquor Atropinæ Sulphatis 1 to 3 minims three times daily after meals.—H. D. O'Sullivan, B.M.J. i./23,18.

℞ **Atropinæ Salicylas** $C_{17}H_{23}NO_3.C_7H_6O_3 = 427{\cdot}36$

℞ **Atropinæ Valerianas** $(C_{17}H_{23}NO_3.C_5H_{10}O_2)_2H_2O = 800{\cdot}78$

Dose of either $\frac{1}{60}$ grain (**0·001 Gm.**).

White crystalline powders—the latter is used for neuralgia, neurasthenia and in asthma (minute doses).

℞ **Liquor Atropinæ Salicylatis.**—Atropine $\frac{1}{2}$ grain, Salicylic Acid $\frac{3}{4}$ grain, Water 1 ounce.

℞ **Atropinæ Sulphas** (*Off.*). P.G.V., P. Helv., P. Jap. $(C_{17}H_{23}NO_3)_2H_2SO_4 = 676{\cdot}63$. P.G. and Fr. Cx. $+H_2O$.

Dose.—$\frac{1}{200}$ to $\frac{1}{100}$ grain (**0·0003 to 0·0006 Gm.**) increased to $\frac{1}{16}$, or in cases of acute mania $\frac{1}{8}$ grain. Fr. Cx. has maximum dose in 24 hours $\frac{1}{32}$ grain approx.

Opaque white minute crystals or granules, soluble 1 in less than 1 of water.—W. H. M. Commercial samples melt mostly at 186° to 187° C. P. Jap. 180° C.

Incompatibles.—Bromides, Iodides. Quinine Hydrochloride is incompatible, but the acid Hydrochloride does not precipitate in reasonable dilutions. See also under Atropine.

Uses.—See Atropine (base).

℞ **Tablets** $\frac{1}{100}$ grain (**0·0006 Gm.**).

Treatment of ulcus ventriculi by injections of $\frac{1}{64}$ grain thrice daily for some weeks caused hyperacidity to disappear or diminish. Gives rest to the stomach.—M. '08, 153.

Ptyalism is relieved by taking Atropine Sulphate $\frac{1}{300}$ grain in water every 4 hours.—Beddoes.

℞ **Granules de Sulphate d'Atropine.**—Fr. Cx. contain 1 mgr.

℞ **Compound Asthma Fluid** (**Martindale**).

This preparation is only supplied on a prescription by a qualified medical practitioner.

It contains, amongst other ingredients, a small proportion of atropine, and is found of considerable value in preventing attacks of asthma. A few "blows" from a fine spray will be found sufficient to ward off an attack. A special **Spray** is made for the fluid.

It is prepared in 3 strengths, designated 'A' 'B' and 'C' respectively. We find by experience that the 'A' strength is well tolerated by all sufferers, the 'B' being double strength of 'A' in Atropine is often more effectual. The 'C,' double strength of 'B,' is used by confirmed asthmatics and affords relief.

The use of atropine in asthma was first advocated by Trousseau. Its employment may effect permanent relief.

℞ **Lamellæ Atropinæ, Discs of Atropine** (*Off.*).

Contain $\frac{1}{5000}$, also made with $\frac{1}{2000}$, and $\frac{1}{1000}$ grain of the sulphate in each, for dilating the pupil; others containing ℞ $\frac{1}{500}$ (R.O.H.) and ℞ $\frac{1}{250}$ grain paralyse the accommodation. Also prepared containing ℈ ℞ Atropine Sulphate $\frac{1}{1000}$ grain combined with Coca ine Hydrochloride $\frac{1}{200}$ grain, and $\frac{1}{50}$ grain of each, and ℈ ℞ Cocaine $\frac{1}{200}$ with Atropine $\frac{1}{5000}$. (R.O.H. has ℈ ℞ Atropine $\frac{1}{200}$, Cocaine $\frac{1}{100}$ grain. ℈ ℞ Atropine Sulphate $\frac{1}{5000}$ grain with $\frac{1}{300}$ grain of Morphine are also made).

℞ **Hypodermic Tablets** contain $\frac{1}{200}$, $\frac{1}{150}$, $\frac{1}{100}$, $\frac{1}{60}$, and $\frac{1}{50}$ grain in each, also ℈ $\frac{1}{120}$ grain combined with Morphine Sulphate $\frac{1}{2}$ grain, and Atropine Sulphate $\frac{1}{200}$ grain combined with Morphine Sulphate $\frac{1}{4}$ grain, *vide* also **Morphine Sulphate.**

℞ **Sterules, Hypodermic,** contain $\frac{1}{100}$ grain in 8 minims. This is the strength of ℞ **Injectio Atropinæ Hypodermica, B.P.C.** *Dose.*—2 to 8 minims.

℞ **Liquor Atropinæ Sulphatis.** *Off.*

Dose.—$\frac{1}{2}$ to 1 minim (**0·03 to 0·06 Cc.**), or more.

Strength 1%. Should be directed to be freshly prepared.

℞ **Guttæ Atropinæ Sulphatis, R.O.H.,** $\frac{1}{4}$, $\frac{1}{2}$, 1, or 2%*.

St. Th. H. has 0·5 or 1%; U.C.H. 0·5 or 1%. St. M.'s H. 0·5%.

℞ **Guttæ Atropinæ cum Zinco, R.O.H.**—Atropine Sulphate 0·5 or 1, Zinc Sulphate 0·25, Sterilised Distilled Water to 100.

Chalk's Bottles with rubber cap on hollow stopper are convenient for eye drops and mostly employed. They are supplied in colourless and amber glass Metal cases, sterilisable for same, are durable, and suitable for travelling.

Ophthalmic Bottle, Lang's, is intended for ophthalmic solutions and ointments. It has no ledges on which dust can accumulate. The cap of the bottle when removed rests upon three points so as to pick up the minimum of dust. A small rod or pipette stands inside.

Eye Rods have (i) pointed, (ii) flattened or (iii) bulbous ends (Lang's) for ointments or solutions.

℈ ℞ **Guttæ Atropinæ cum Cocaina, R.O.H.**

Atropine Sulphate 1, Cocaine Hydrochloride 2, Sterilised Distilled Water to 100. St. Th. H. has the same. St. M.'s H. Atropine Sulphate 0·5, Cocaine Hydrochloride 2·5, Water to 100.

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* *A simple solution of Atropine is a preparation of Atropine, but a compound of several substances to which a small percentage of Atropine has been added, may more properly be regarded as a "preparation or admixture containing Atropine"*—Glyn-Jones.

℞ **Sterules, Ophthalmic, of Atropine Sulphate** Solution 1% are made; also of ℞ **Atropine Sulphate** Solution ½% with **Cocaine Hydrochloride** 2½%.

℞ **Guttæ Atropinæ et Quininæ** (Liverpool Eye and Ear Infirmary). Atropine Sulphate 4 grains, Quinine Sulphate (bi-sulphate) 4 grains, Distilled Water 1 ounce.

℞ **Glycerinum Atropinæ.** St. Th. H. has Atropine Sulphate 25½ grains dissolved in Water 5 ounces, add Compound Tincture of Lavender 100 minims, and made up to 1 pint with Glycerin. This is more cleanly than Glycerinum Belladonnæ and does not stain. It replaces Glycerinum Belladonnæ. U.C.H. is similar.

The resinous matter in the Compound Tincture of Lavender deposits. We found the following to keep better: Atropine Sulphate 127½ grains, Water 25 ounces, Spirit of Lavender 2 minims, Spirit of Rosemary 2 minims, Cinnamon Oil 1 minim, Magenta Solution *q.s.* Alcohol 90% 1 ounce, Glycerin to 100 ounces.

℞ **Linimentum Atropinæ.**

Atropine 1 (more or less, if ordered), Oleic Acid 15, Castor Oil 15, Oil of Lavender 1, Alcohol (90%) *q.s.* to 100.

In lumbago and other rheumatic affections is very serviceable used with gentle friction; it is readily absorbed.

℞ **Oleum Atropinæ.**

Atropine 1, Castor Oil *q.s.* to 100. Heat to dissolve. Forms a stable solution, *vide* Alkaloidal Oils, **under Oleum Ricini.**

℞ **Pessaries of Atropine** are prepared (weight 120 grains) with gelatin mass or at times with oil of theobroma, containing generally $\frac{1}{20}$ grain of the alkaloid in each.

℞ C. H. W. has Vaginal Suppositories of Atropine Sulphate $\frac{1}{18}$ grain, Lead Iodide 10 grains, Theobroma Oil to 2 drachms.

℞ **Pilula Atropinæ,** $\frac{1}{120}$, $\frac{1}{100}$, $\frac{1}{80}$, $\frac{1}{60}$ grain in each.

Taken at night, to check sweating. May cause dryness of the throat.

℞ **Pilula Atropinæ, Arsenici et Quininæ.**

Quinine Sulphate 150 grains, Arsenious Acid Trituration 10 grains, Atropine Sulphate Trituration 5 grains with Milk Sugar and Acacia *q.s.* to make 100 pills. For catarrhal cold, if taken in early stage, one every 3, 4, or 6 hours, "nips it in the bud."

℞ **Unguentum Atropinæ,** R.O.H., *Syn.* **Vaselinum Atropinæ** Atropine 0·5, 1 or 2, Soft Paraffin 100; heat till dissolved. ℞ **Unguentum Atropinæ cum Acido Borico,** R.O.H., has Atropine 1, Powdered Boric Acid 15, Soft Paraffin to 100; and ℞ **Unguentum Atropinæ cum Cocaina,** R.O.H., has Atropine 1, Cocaine (alkaloid) 2, in Soft Paraffin 100. ℞ **Unguentum Hydrargyri Oxidi Flavi cum Atropina,** R.O.H., has Yellow Mercuric Oxide 1, and Atropine 0·5, Soft Paraffin 100. ℞ **Unguentum Iodoformi cum Atropina,** R. O. H. Iodoform 15, in place of the Mercuric Oxide in last preparation.

An Ointment made with Atropine base 1, in Soft Paraffin 99, throws out minute crystals, visible only under the microscope,

even before cooling, but these minute crystals are not harmful. F. A. Juler recently (1923) tried at our request, on numerous patients, three ointments, one made with Oleic Acid and prepared lard, according to the B.P. which contains far more Oleic Acid than theory requires; the second made with Atropine Base and Soft Paraffin and a theoretical quantity of Oleic Acid; and the third consisting of Atropine Base in Soft Paraffin. Mydriasis and cycoplegia were in each case satisfactory. As to irritation, there was little to choose between the three samples—only one or two patients complained to a slight extent.

On the whole, we can see no advantage in using Oleic Acid at all.

The Ointment should be *rubbed down thoroughly* while cooling, if made without neutralising.

Earlier Expts. are reported in previous Edns.

Assay of Atropine in B.P. ointment. It is best to dissolve in Chloroform; extract with N/20 Sulphuric Acid and back titrate with N/20 KOH, using Brom-phenol Blue.—H. J. Foster, P.J. i./23,479.

℞1 **Atropinæ Methyl-Bromidum.** *Syn.* MYDRIASINE.
$C_{17}H_{23}O_3N-CH_3Br=384{\cdot}226$.

Dose.—$\frac{1}{64}$ grain to $\frac{1}{32}$ grain (**0·001 to 0·002 Gm.**).

Manufacture.—**An addition product of Methyl-bromide to the alkaloidal base.**

White crystals soluble in water 1 in 1 easily, and in alcohol 90% 1 in 8. Given internally for complaints similar to those for which atropine is employed. Also subcutaneously in croupous pneumonia, pleuritis sicca and appendicitis; dyspepsia with pyrosis (with sodium bicarbonate), and epilepsy (with bromide). As effect passes off rapidly it is useful in $\frac{1}{2}$ to 2% solution with cocaine hydrochloride 1% for dilating the pupil in suspected iritis for ascertaining whether adhesions exist.

For toothache, Atropine Methylbromide $\frac{1}{50}$ grain, with Aceto-Salicylic Acid 15 grains, has been given with good effect.

For bronchitic and pneumonic affections in children the following has been advised: Atropine Methylbromide $\frac{1}{20}$ to $\frac{1}{12}$ grain, Tartarated Antimony $\frac{1}{2}$ grain, Antipyrin 6 grains, Syrup 1 ounce, Fresh Ipecacuanha Infusion (1 in 200) to 4 ounces. *Dose.*—1 drachm every 2 hours.

To control irregularity of heart action may be combined with Digitalis Infusion.

℞1 **Homatropine,** $C_{16}H_{21}NO_3=275{\cdot}256$.

Manufacture of Homatropine. — Heat Atropine Mandelate seven days on the water bath with dilute Hydrochloric Acid. Precipitate the clear liquid with Potassium Carbonate and shake out the oily base with Chloroform. Remove the latter and convert the base for further purification into the Picrate. Dissolve the picrate in water *q.s.* to retain it in solution in the cold. Add excess of Potassium Carbonate and shake out with Chloroform. The base is difficult to obtain crystalline.

℗ **Homatropine Hydrobromide,** ℗ **Hydrochloride,** $C_{16}H_{21}NO_3.HCl$ =311·724, and ℗ **Salicylate** $C_{16}H_{21}NO_3.C_7H_6O_3$ = 413·339 are readily obtainable in minute granular white crystals. Their solutions act as quick and decided local mydriatics, the pupil rapidly returning to its normal condition. The mydriatic action commences in ¼ to ½ hour, and disappears in from 6 to 24 hours. The salts are freely soluble in water; Homatropine (the base) is nearly insoluble in water, but soluble in oils, or 1 in 100 of soft paraffin. *Dose of each.*—$\frac{1}{80}$ to $\frac{1}{20}$ grain **(0.0008 to 0.003 Gm.)**

Action in checking night-sweating is said to be inferior to atropine and picrotoxin. Large doses may cause, like atropine, staggering gait, and delirium in children. Homatropine slows the heart beats and renders them irregular in force and rhythm.

℗ **Oleum Homatropinæ.** A 2% solution in Castor Oil, dissolved by heat (*using the smallest amount possible*). Powder the Homatropine first.

℞ ℗ **Oleum Homatropinæ cum Cocaina** R.O.H., contains in addition 2% of Cocaine.

Homatropine Oil is used in preference to Atropine in estimating lesions of refraction; inconvenience of mydriasis may be partially overcome by Eserine. These oily solutions are not washed out by the tears.

℗ **Homatropinæ Hydrobromidum.** **U.S., P.G.V. P. Helv., P. Svec.** and **P. Jap.** $C_{16}H_{21}NO_3HBr$=356·184.

Dose.—$\frac{1}{80}$ to $\frac{1}{20}$ grain **(0.0008 to 0.003 Gm.)**. (U.S. *av.* $\frac{1}{120}$ grain). In minute trimetric crystals, soluble 1 in 6 of Water.

℗ **Guttæ Homatropinæ R.O.H.,** 1 or 2%.

℞ ℗ **Guttæ Homatropinæ cum Cocaina, R.O.H.**

Homatropine Hydrobromide 1 or 2, and Cocaine Hydrochloride 2 in Water 100.

Menthol 2 grains, Methyl Salicylate 2 minims, and Tincture of Iodine 2 minims, to the pint of distilled water as an antiseptic solvent of Homatropine and other alkaloidal salts for eye work.—N. Bishop Harman, B.M.J. ii./16,178. See also *ibid.* i./20,599.

℗ **'Sterules' (Ophthalmic) of Homatropine Hydrobromide Solution,** 1% are prepared, also

℞ ℗ **'Sterules' (Ophthalmic) of Homatropine Hydrobromide Solution** 1% with **Cocaine Hydrochloride** 2½%.

℗ **Injectio Homatropinæ Hypodermica,** 1 in 120, is used.

Dose.—1 to 6 minims **(0·06 to 0·4 Cc.)**.

℗ **Tablets, Hypodermic,** contain $\frac{1}{200}$ grain.

(Sterile Capsules of Distilled Water, containing 1 drachm are useful for dissolving hypodermic tablets in the syringe.)

℗ **Lamellæ Homatropinæ** (*Off.*) contain $\frac{1}{100}$ grain **(0.0006 Gm.)** of Homatropine Hydrobromide.

℞ ℗ **Lamellæ Homatropinæ et Cocainæ (Gelatin Ophthalmic Discs)** contain of each $\frac{1}{50}$ grain **(R.O.H.)** for paralysing the accommodation, also made $\frac{1}{200}$ grain of each, also Homatropine $\frac{1}{5000}$ grain with Cocaine $\frac{1}{200}$ grain, and $\frac{1}{5000}$ grain of each.

℞ ***Eumydrine.** **Methyl-Atropine Nitrate.**

$C_{16}H_{19}NO_3.CH_3.CH_3\ HNO_3$=366·314.

TRADE MARK 322533, PATENT 25,804/1901 became void 1906.

Dose.—$\frac{1}{60}$ to $\frac{1}{24}$ grain (**0·001 to 0·0025 Gm.**).

Manufacture. — Although the patent specification mentions the use of Methyl Nitrate, to be employed by direct addition in presence of Methyl Alcohol at a temperature of 110° C. in a closed vessel for 2 hours, we believe that the more rational procedure would be to heat the alkaloidal base with Methyl Iodide in Methyl Alcohol Solution to 100° C., forming Methyl-Atropine Hydroiodide, and then to convert this into Methyl-Atropine by means of freshly precipitated Silver Oxide. Finally prepare the nitrate in the usual manner.

A white odourless powder, M.pt. 163° C., soluble in water, a powerful mydriatic, and less poisonous than Atropine. 1% or 2% solution dilates the pupil after 25 minutes, the maximum is reached in 50 minutes. Dilatation persists for 12 hours.

AURANTIUM.

Aqua Aurantii Floris (*Off.*). AQUA NAPHÆ, **Ph. Ned.** *Dose.*—$\frac{1}{2}$ to 2 drachms (**2 to 8 Cc.**) of the diluted water.

Distilled from the flowers of the bitter orange, *Citrus Aurantium*, var. *Bigaradia*. Is a saturated solution of the oil, and must be diluted immediately before use with twice its volume of distilled water.

Oleum Aurantii Dulcis expressed from the fresh peel of the fruit of the sweet orange, Citrus Aurantium. (*Oleum Aurantii Amaræ* is obtained from the peel of the fruit of the bitter orange.)

Sp. Gr. at 15° C. 0·847–0·852 O.R. +96° to +98° at 20° C. (at Messina).

Terpeneless Oil of Orange is prepared, being many times more potent in flavour and soluble in 60% spirit, *cf.* Vol. II. for further details of this product.

Oleum Neroli. The oil obtained in the distillation of above flowers is used in perfumery. Dilution with twice its volume of absolute alcohol preserves it. *For analytical data of this Oil vide Vol. II.*

Cortex Aurantii (*Off.* and **Indicus**).

Dried and fresh outer peel of the Bitter Orange (in India other varieties may be used if aromatic and bitter).

Tinctura Aurantii (*Off.*). 1 of fresh peel in 4 of Alcohol (90%).

Dose.—$\frac{1}{2}$ to 1 drachm (**2 to 4 Cc.**).

Boa says that 90% Alcohol is too strong—it takes out the whole essential oil content, terpene, citral, etc. About 10% only of Essential Oil of Orange Peel is flavouring and is soluble in comparatively dilute alcohol, therefore make the Tincture using equal volumes of 90% alcohol and water. Some have suggested 70%.

Mixtures containing Salts of Iron will become dark in colour with all preparations of orange peel.

Syrupus Aurantii (*Off.*). Tincture of Orange 1, Syrup 7.

Dose.—$\frac{1}{2}$ to 1 drachm (**2 to 4 Cc.**).

Infusum Gentianæ Compositum Concentratum.

Dose.—30 to 60 minims (**2 to 4 Cc.**).

Gentian and Orange Peel in No. 10 pdr. each 2, Lemon Tincture 2, Orange Tincture 1, Alcohol 90% 3·5, Diluted Chloroform Water to 20 by process (a) for infusions (*q.v.*) 1 diluted to 8 resembles B.P. Infusion.

AURINARIA.

Ear cones or aural bougies are made either with Gelatin or Cacao butter basis, and are medicated :—

Aurinarium—

Acidi Borici 1 gr.
Acidi Carbolici $\frac{1}{10}$ gr.
℞ ℙ1 Cocainæ Hydrochloridi $\frac{1}{10}$, $\frac{1}{5}$ gr.
*Unguenti Hydrargyri Nitratis $\frac{1}{3}$ gr.
*Iodoformi $\frac{1}{2}$ gr.
℞ ℙ1 *Morphinæ Hydrochloridi $\frac{1}{10}$ $\frac{1}{5}$ gr., atque cum Cocaina $\frac{1}{10}$ gr.
℞ ℙ1 *Morphinæ $\frac{1}{10}$ Cocainæ $\frac{1}{10}$ Acidi Borici 1 gr.
℞ ℙ1 *Morphinæ $\frac{1}{10}$ gr., Ext. Bellad. $\frac{1}{5}$ gr.
℞ ℙ1 *Opii, $\frac{1}{5}$, ℞ ℙ1 $\frac{1}{2}$ gr.
*Plumbi Acetatis $\frac{1}{2}$ gr., atque cum Acid. Borico 1 gr.
℞ ℙ1 *Plumbi Acet. et Opii $\frac{1}{5}$ gr.
*Zinci Sulphatis $\frac{1}{2}$ gr.
*Zinci Sulphocarbolatis $\frac{1}{2}$ gr.

They should be retained with a pledget of cotton wool.

AURUM.

Au = 197·2.

For dental fillings the metal is employed in "cohesive" and "non-cohesive" form.

Colloidal Gold see Colloidal Metals, p. 379.

Auri Bromidum. $AuBr_3$ = 436·96.

Dose.—$\frac{1}{64}$ to $\frac{1}{10}$ grain (**0·001 to 0·006 Gm.**), increased to $\frac{1}{5}$ grain, well diluted.

A brown powder, soluble in water 1 in 75.

Uses.—In epilepsy, hysteria and migraine, is well tolerated. In nervous dyspepsia, amenorrhœa, and chronic Bright's disease. Epileptics who have taken it sometimes remain for years free from attacks. Useful in alcoholic neurasthenia ; the 'Gold Cure' combined with Hyoscyamine (or Atropine) and Strychnine treatment has proved of value.

ℙ1 **Liquor Auri et Arsenii Bromidi.**

Auric Bromide $1\frac{1}{2}$ grains, Oxybromide of Arsenium 3 grains [or Clemens' Solution (*q.v.*) 192 minims], Distilled Water to 1 ounce. *Dose.*—5 to 10 minims (**0.3 to 0.6 Cc.**).

Liquor Auri et Hydrargyri Bromidi.

Auric Bromide, Mercuric Bromide, of each $1\frac{1}{2}$ grains, Distilled Water to 1 ounce. *Dose.*—5 to 10 minims (**0.3 to 0.6 Cc.**) has been used in neurasthenia, epilepsy, syphilis, and acne.

Gold Chloride, Varieties of, in Commerce.

Auri Tri-Chloridum (Purum), $AuCl_3$ = 303·58. Contains about 65% Au. and is official in Fr. Cx. and the Portuguese Pharmacopœia. This salt is in very little use in this country. A brown variety is also made. It contains xH_2O.

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* These Aurinaria, unless ordered to the contrary, are prepared with cacao butter basis. The others are prepared with Gelatin. Cacao butter basis with wax is more suitable for export to the tropics.

Auri Tri-Chloridum Acidum. *Syn.* **Aurochloric Acid.**
$AuCl_3.HCl.4H_2O = 412{\cdot}112$.

Dose.—$\frac{1}{64}$ to $\frac{1}{16}$ grain (**0·001 to 0·004 Gm.**), increased to $\frac{1}{4}$ grain. In yellow crystals; contains about 50% of gold. Is deliquescent and easily soluble in water. Has been given as an alterative in phthisis.

Sterules of this Salt and of Gold and Sodium Chloride in various amounts have been made.

Auri et Sodii Chloridum. **Gold and Sodium Chloride**
$AuCl_3.NaCl,2H_2O = 398{\cdot}072$ (Fr. Cx.)

Dose.—$\frac{1}{30}$ to $\frac{1}{12}$ grain (**0·002 to 0·005 Gm.**), increased to $\frac{1}{2}$ grain in a pill with kaolin ointment. *Hypodermically*, $\frac{1}{12}$ grain (**0·005 Gm.**) doses have been given.

This is the ordinary **Commercial "Chloride of Gold,"** *e.g.*, the "Scales" Brand, as largely used in photography. An orange-yellow crystalline, deliquescent powder, soluble 1 in 2 of water, only partially soluble in alcohol. The Fr. Cx. preparation contains a *molecule of each salt* combined, yielding approximately 50% of metallic gold. The U.S. preparation is a mixture of *equal parts by weight* of the two salts. It yields 30% of gold. This 30% product is not largely used in this country. It is sometimes used as a caustic, and given internally for syphilis. Combined with strychnine it is useful in neurosis.

In locomotor ataxia, the Chlorides of Gold and Sodium $\frac{1}{10}$ grain in pill form seem to have some power of retarding the degenerative process; arsenic $\frac{1}{20}$ grain in solution thrice daily is also believed to act in the same way. Alternate monthly courses of each advocated.—Whitla, Pract. Med.

Cirrhosis of the kidney has been well treated by Chloride of Gold and Sodium, said to improve character of the urine, to diminish the frequency of nocturnal micturition and to increase general well-being.—Tirard, Med. Treatment.

Gold Salts intravenously in tuberculosis. **'Krysolgan'** produced severe reactions.—B.M.J.E. i./22,77.

Commercial "Chloride of Gold and Sodium" consists of **Auri et Sodii Chloridum** (50% Au) mixed with an equal weight of sodium chloride It contains, therefore, 25% Au approximately.

℞ **Auri et Potassii Cyanidum.** — $KAu(CN)_2 + 2H_2O = 324{\cdot}358$.

Dose.—$\frac{1}{64}$ to $\frac{1}{3}$ grain (**0·001 to 0·02 Gm.**).—*with caution.*

White crystalline soluble powder.

In lupus and in syphilis has been used. Intravenously the dose was found to be 0·02 to 0·05 Gm. for adults, and 0·0005 to 0·03 Gm. for children. To the dose in 1% solution 50 Cc. of Normal Saline Solution are added, and given every second or third day to the extent of 12 injections. The injection is said to be quite painless. After 48 hours a local reaction occurs. *Caution*:—The doses seem large. We have no personal knowledge of them.

BARIUM.

Ba = 137·37.

Barii Sulphidum.—BaS = 169·43.

Dose.—$\frac{1}{2}$ to 1 grain in pills coated so as to be more likely to dissolve in the intestines than in the stomach.

A greyish yellow powder, soluble in water, given as an alterative in syphilitic affections.

Barium Sulphide Depilatory. *Syn.* (Causticum Barii).

Barium Sulphide, in fine powder from 1 to 3, Wheat Starch 3.

When required for use, make into a cream with water, spread on the part and let it remain five or ten minutes, then remove with a blunt knife.—N.B.—It temporarily reddens the skin.

Another formula is Barium Sulphide 5, Powdered Soap 1, French Chalk 7, Starch 7. One part of this mixed with 3 of water, applied to the skin, and to avoid possible dermatitis, is washed off after 5 minutes. Applied in hypertrichosis from time to time will keep the growth under.

Barii Sulphas.—$BaSO_4$=233·43.

Dose.—For 'X' Ray work only, 2 to 5 ounces (**60 to 150 Gm.** approx.) in a cornflour or other 'meal' of about 6 to 15 ounces.

A heavy white powder insoluble in water and acids.

In 'X' ray diagnosis for outlining portions of the alimentary tract, recently employed instead of Bismuth Carbonate and Subnitrate (*q.v.*).

Has the advantage of being totally insoluble. Cases of Bismuth poisoning have resulted from the use of Bismuth Salts. The latter, however, have the advantage of higher molecular weight, and hence form darker shadows.

Barium Sulphate Suspensions in Olive Oil 10, 20%, etc., in bladder examination.—L. i./14,236

For an opaque enema—Barium Sulphate 12 ounces mixed with Kaolin and warm water.—A. C. Jordan, B.M.J. ii./13,1348.

Enema Barii Sulphatis C.X. *For X-ray Examinations.*

Barium Sulphate 192, Methylated Spirit 45, Mucilage of Gum Acacia 20, Distilled Water to 900 (6 ounces, 1½ ounces, ¾ ounce, to 30 ounces respectively).

Emulsio Barii et Bismuthi C.X. *For X-ray Examinations.*

Barium Sulphate 16, Bismuth Carbonate 16, Water 45.

(½ ounce, ½ ounce and 1½ ounces respectively.)

Barium Thiosulphate inadvertently administered in place of Barium Sulphate caused death.—P.J. ii./21,315; C. & D., Oct., 1921, p. 47.

Caution.—*Barium Carbonate* is also soluble and hence poisonous. Confusion with Bismuth Carbonate occurred.—P.J. ii./21,344.

BELLADONNA.

Deadly Nightshade.

P1 "*Belladonna and all preparations or admixtures (except Belladonna Plasters—which are* Ⓟ*) containing* 0·1 *or more per cent. of Belladonna Alkaloids.*"

All parts of the plant *Atropa Belladonna* (*Solanaceæ*) yield the alkaloids atropine and hyoscyamine. The root contains from 0·3 to 0·8% or even more exceptionally of total alkaloids. (Maben states rarely as much as 0·5%.) The leaves contain 0·2 to 0·7%, principally Hyoscyamine.

For details as to varying Alkaloidal content of the Drug and Assay Methods see Vol. II.

INTERNATIONAL PREPARATIONS of Belladonna compared, with special references to their standardisation.—A. J. Jones, P.J. ii./23,106.

Antidotes.—See Atropine, Poisoning by belladonna is well treated by pilocarpine.

Poisoning by children eating Belladonna berries. Pilocarpine 1/10 grain hypodermically, hot water bottles, subsequently more

pilocarpine (1/6 grain) and again repeated with soap enema. Recovery.—Mary E. Joll. L. ii./16, 647.

Eating rabbit which had fed on the plant caused poisoning. Pupils became dilated, mouth dry; giddiness and rapid pulse.—D. Firth and J. R. Bentley, L. ii./21,901.

Poisoning by topical application of a liniment containing Belladonna.—Fried, per Clin. Jl. May 30/23,264.

℗ **Belladonnæ Folia** (*Off.*), U.S., and P. Helv. contain not less than 0·3% total or mydriatic alkaloids. *Dose.*—1 grain.

Those of Fr. Cx. have no standard. Maximum single dose 2 grains, maximum during 24 hours 7½ grains approximately.

℗ **Belladonnæ Radix** (*Off.*) without standard, U.S. requires 0·45% total alkaloids of Belladonna.

Dose.—¾ grain (**0·5 Gm.**).

Uses.—Externally relieves the pain of rheumatism, neuralgia, chordee, and local inflammations, as of the breast. In leucorrhœa, vaginal injection of Tincture 3, Sodium Bicarbonate 1, and Water 100 useful.—R.

Internally relieves spasm, palpitation, menstrual pain, headache, whooping-cough, petit mal, checks profuse perspiration, and incontinence of urine. In acute sore throat. Acts on the eye as a mydriatic. Relieves the dyspnœa of asthma.

Though used "to allay the sense of griping" in the intestines when given with purgatives there is no evidence that it does so.

Heart failure in diphtheria treated with.—L. i./06,282.

A rash on the skin, said to be like that of scarlet fever, may be produced by internal and local use of Belladonna.—Ringer and Sir Lauder Brunton.

May produce congestion of the throat.—B.M.J. ii./09,542.

Obesity associated with voracious appetite well treated. By its inhibitory action on the secretion of the gastric glands Belladonna reduces hyperacidity of the gastric juice and thus takes the edge off the appetite. Especially indicated where there is cardiac weakness which prohibits physical exercises.—B.M.J.E. ii./13,39, *cf.* also Atropine.

Urinary incontinence.—Belladonna should only be used to 'break the habit' and never pushed for more than two months at a time. It is useless and even harmful when there is definite lack of tone in the sphincters; here Nux Vomica is indicated. Thyroid (advocated by Leonard Williams) is useful in some cases, especially when there are adenoids. Alkalis may be useful where the urine can be shown to be hyperacid.—F. Hernaman-Johnson, L. i./21,1295.

Asthma is due to over-excitability of the pneumogastric system; Belladonna is the best remedy.—Per Pres., Jan., '23,10.

℗ **Collodium Belladonnæ.**—*Martindale.*

Shake liquid Extract of Belladonna (*Off.*), 50 Magnesium Oxide Light 1, with Canada Turpentine 4, castor oil 2 and ether 40, allow to stand 12 hours. Decant, filter, dissolve camphor 1½, and pyroxylin 2½ in the mixture and add ether *q.s.* to 100.

℗ **Emplastrum Belladonnæ.** (*Off.*) (℗ *cf.* Emp. Plumbi).

The B.P. '98 plaster produced toxic symptoms (skin irritation).—It was only half the strength of that of the B.P. 1885, but it was still too strong to be used with safety. The *Off.* plaster is now again reduced to ½ strength, viz., it contains 0·25% alkaloids.

Dixon says Atropine has no action on mammary secretion as the latter is not under nervous control (action solely on nerve endings).—B.M.J. ii./09,329,540

An explanation of its supposed effect in stopping milk secretion is that after the plaster is applied no milk is removed, and so less and less is secreted—the action is merely mechanical.—D. Grieve, C. & D., Dec., 1921, p. 856.

See also K. Mackenzie under Pituitary Extract.

Bee and wasp stings are well treated by belladonna plaster—if slight, left on short time; if severe (? entered vein), several days may be necessary—gives considerable relief. Probably good for mosquito stings also.

℗ **Emplastrum Belladonnæ Extensum.**

Belladonna plaster in rubber combination spread on calico in porous sheets 7 in. by 5 in. and in yard rolls 7 in. wide, porous and non-porous, also prepared with belladonna and aconite combined.—(*American*).

℗ **Emplastrum Belladonnæ U.S.**, IX. An adhesive plaster containing 30% of Extract of Belladonna leaves and not less than 0·35% or more than 0·4% of the alkaloids of the leaves.

℗ Fr. Cx. has Belladonna Extract (Fr. Cx. *q.v.*) 1, Elemi 1, Diachylon Plaster (Fr. Cx.) 2.

ℙ1 **Extractum Belladonnæ Liquidum** (*Off.* and B.P. '98).

Dose.—⅓ to 1 minim (**0·02 to 0·06 Cc.**).

Prepared from Belladonna root in fine powder, by repercolation process, adjusting so that the extract contains 0·75% alkaloids.

ℙ1 **Extractum Belladonnæ Siccum** (*Syn.* **Alcoholicum**) (*Off.*)

Dose.—¼ to 1 grain (**0·016 to 0·06 Gm.**).

This is now prepared *from the leaf*—it is a mixture of alcoholic extract and powdered leaf, containing 1% of alkaloids=F.I. nearly.

Enuresis in children is best treated by increasing doses of Belladonna extract at bed time, tonic measures, such as codliver oil, iron and nux vomica should be employed during the day time.—Tirard, Med. Treatment.

ℙ1 **Extractum Belladonnæ F.I.** to be a "solid" extract (containing about 10% of water) prepared by means of alcohol 70% from the leaf.—Fr. Cx., and P. Dan. agree with F.I. The Fr. Cx. follows the F.I. method of making and gives a method of estimating, but does not set up a standard. It states max. single *dose* ½ grain. Max. in 24 hours 1½ grains approx.

ℙ1 **Extractum Belladonnæ Foliorum U.S.IX.**, made with 3 parts alcohol and 1 water as solvent and contains added glucose for pilular consistence. Powdered Extract is made differently, but contains the same percentage of alkaloids. Contains a mean of 1·25% Belladonna alkaloids.

ℙ1 **Extractum Belladonnæ, P. Austr.**, is alcoholic from the leaves and contains 2% alkaloids; ℙ1 **Ph. Ned.** is the same but contains not less than 1·15% alkaloids ℙ1 **P. Belg.** contains 1·5% alkaloids. For average yield of alkaloid, see Vol. II.

ℙ1 **Extractum Belladonnæ Viride** (B.P. '98).

Dose.—¼ to 1 grain (**0·016 to 0·06 Gm.**), increased to 2 grains or more.

A green extract prepared from the expressed juice of leaves and young branches (3 to 3½ ounces are procurable from a pound of leaves); it contains from 0·5 to 2·0% (average 1) of alkaloids, and standardised to contain 1%.

ℙ1 **Fluidextractum Belladonnæ Radicis, U.S.**

Average dose.—1 minim (**0·06 Cc.**) Hydroalcoholic percolate; contains 0·45 Gm. Belladonna alkaloids in 100 Cc. *For assay vide Vol. II.*

ℙ1 **Glycerinum Belladonnæ, B.P.C., R.O.H.**

Green Extract of Belladonna, 1 ounce; Boiling Distilled Water, 1 drachm. Rub in a warm mortar to a smooth paste, and add Glycerin, *q.s.*, to 2 ounces (fluid).

To check pain and inflammation, is often painted on boils, abscesses and carbuncles, and covered with a poultice, also applied on lint to the breasts to disperse milk.

Tragacanth added in proportion of 6 grains to the ounce would thicken the preparation.

℞ **Linimentum Belladonnæ** (*Off.*).

Camphor 1, Alcohol (90%) 6. Dissolve and add Liquid Extract of Belladonna 10, Distilled Water 2, Alcohol (90%) *q.s.* to 20. A useful sedative for neuralgia and rheumatism. Contains 0·375% alkaloids.

U.S. has Camphor 5, Fluidextract of Root to 100.

Sprinkled on impermeable piline relieves lumbago.

Poisoning by the Methylated Liniment. Strychnine hypodermically, strong tea, and making the patient vomit, brought a patient round.

℞ **Linimentum Belladonnæ cum Chloroformo.** Chloroform Liniment 1, Soap Liniment 1, Belladonna Liniment 2.

℞ B.P.C. Chloroform 1, Belladonna Liniment 7. (The previous form may be better for sensitive skins.)

℗ **Pilula Quininæ cum Belladonna, R.O.H.**

Green Extract of Belladonna ⅛ grain, Quinine Sulphate 1 grain, Confection of Roses *q.s.*

℞ **Pilula Belladonnæ, Nucis Vomicæ et Cannabis.**

Extract of Belladonna, Nux Vomica Extract and Cannabis Extract, of each ½ grain. For the constipation in gastric ulcer. The cannabis has a good effect on the mental side, belladonna regulates peristalsis and the nux vomica has a good effect as an aperient and for improving tone of the gut.

℞ **Suppositoria Belladonnæ** (*Off.*).

B.P. '98 contained Alcoholic Extract of Belladonna (root) 1½ grains (0·1 Gm.) *Off.* is now made same alkaloidal strength from liquid extract.

℗ **Pessaries** (60 grains weight) may also be made containing the same or double the quantity of extract. *Vide also* **Ovules.**

Unilateral convulsions produced by their use, together with usual dryness of throat, dilated pupils (special idiosyncrasy)—a recorded case.

℥ ℞ **Suppositoria Belladonnæ** ½ grain, **et Morphinæ Hydrochloridi** ¼ grain.

These possess a useful sedative effect, and are valuable in irritated and painful conditions of the rectum and prostate and for chordee.

℗ **Tinctura Belladonnæ** (*Off.*).

Dose.—5 to 15 minims (0·3 to 1 Cc.).

Now made 10% *with dried leaf* and standardised to 0·035% alkaloids=F.I. approx. Fr. Cx. and U.S. are similar. B.P. '98 was Liquid Extract of Belladonna (root) 1, Alcohol (60 per cent.) *q.s.* to 15. Hence the new tincture differs in colour. *It is* $\frac{7}{10}$ *strength of B.P.* '98.

Uses.—Relieves the spasm of asthma and bronchitic cough; also bladder spasm set up by calculi and prostatic irritation. Full doses are useful for incontinence of urine. Of value in dyspepsia (*vide* ref. *infra*).

Flavoring.—Syl Myristicæ, Syl Rosæ; Syrupus Aurantii.

℞ **Tablets** are prepared equivalent to 2 and 5 minims weighing 1 and 2 grains respectively.

Appendicitis has been treated by full doses (10 to 15 minims) with sodium salicylate.

Exophthalmic goitre has been treated with belladonna, and with arsenic, bromide, and digitalis added.

In enuresis valuable, give first potassium citrate, when the urine is hyperacid or Sodium Acid Phosphate if markedly alkaline.

Broncho-pneumonia sometimes well treated in early stages with 4 to 5 minim doses or ¼ grain of extract every 3 or 4 hours according to age of child and severity of case—combine with diuretics and diaphoretics.—M.P.C. Jan. 16, '09,601.

In dyspepsia administration of 5 minim doses of Tincture before food results in reduction of acid values both absolute and relative of the stomach contents. Exerts an influence in inhibiting and relieving spasmodic contractions.—B.M.J. ii./10,1775.

The volume of the gastric contents does not diminish, though the percentage of Hydrochloric Acid in the gastric contents is always diminished. This differs strikingly from the effect of Atropine on other glands.—P.R.S.M., Med. Sect., Dec./10,23.

For ptyalism (in a patient affected with paralysis agitans) 10 drops of Belladonna Tincture thrice daily or Pilocarpine Nitrate $\frac{1}{36}$ grain. —B.M.J. i./13,1143.

℞ **Mistura Belladonnæ Xanthoxyli et Hyoscyami.** *Syn.* Towns' Specific. *Dose.*—6 to 8 minims (0·4 to 0·5 Cc.).

Belladonna Leaf Tincture (U.S. 1890) 2, Fluidextract of Xanthoxylum 1, Fluidextract of Hyoscyamus 1.

The above dose is equivalent to a little less than 3 to 4 minims B.P. '98 Tincture. Said to be specific in morphinism, cocainism, and alcoholism.

Increase from 6 drops, by 2 drops every 6 hours, until 16 drops have been reached. Discontinue for a few doses if symptoms of Belladonna poisoning are observed.—E. Huntington Williams, "Opiate Addiction."

℞ **Linimentum Belladonnæ Æthereum.**

Prepared with Ether, 1 in 1½, with Camphor $\frac{1}{20}$. Recommended in place of Alcoholic Liniments for quicker absorption.—L. ii./90,67; *N.B.*—Name altered. Previously called *Ethereal Tincture.*

℞ **Unguentum Belladonnæ** (*Off.*).

Now contains a basis of Benzoated Lard and Wool Fat. Prepared by evaporating Liquid Extract of Belladonna *q.s.* to provide 0·6% alkaloids, as in B.P. '98.

Said to be too strong for general use and may cause unpleasant symptoms.

To lessen excessive secretion in nasal catarrh, this ointment has been employed diluted 5 to 10 times with Soft Petroleum and a small proportion of Tannin or Gallic Acid added.

Unguentum Populeum, P. Belg. Macerate Dry Belladonna Leaves 125, Dry Henbane Leaves 125 and Dry Poplar Buds 200 (all bruised) in Alcohol 90% 150 for 2 hours; transfer to a water-bath with Lard 1000, heat 3 hours with constant stirring until the Alcohol has evaporated. Strain, press and stir until the ointment sets. The formula in Fr. Cx. differs from this.

BISMUTHUM.

Bi=208·0.

The absorbent action of the preparations of bismuth taken internally is increased by combination with antiseptic compounds. These combinations have been much recommended in those disorders of the digestive tract in which several infectious diseases make their early manifestation. Thus the salicylate, and naphthol, phenol, pyrogallol and bromophenol compounds have been brought into use. These check the fermentative processes forming ptomaines, yet, it is said, do not interfere with intestinal digestion. Bismuth compounds are in general ***incompatible*** with potassium iodide the insoluble brown bismuth tri-iodide being formed.

Bismuth Poisoning.—The most striking features are stomatitis, a black line and white diphtheritic membrane on the gums and bismuth in the urine. Beck's Paste has caused poisonous symptoms.—L. i./13,1039.

Bismuthi Benzoas, Bismuth Oxybenzoate.

C_6H_5—CO.O (BiO) (?)=345·075.

Dose.—5 to 20 grains (**0·3 to 1·2 Gm.**) thrice daily.

A white powder insoluble in water. Fr. Cx. (1884) required 64 to 65% Bismuth Oxide. The compound is not included in Fr. Cx. 1908. Antiseptic, internally in gastro-intestinal diseases, externally to chancroid, indolent and sloughing ulcers.

Bismuthi Carbonas. *Syn.* **Bismuth Oxycarbonate or Subcarbonate.**

$(Bi_2O_2CO_3)_2.H_2O$ = 1034·116. *Dose.*—5 to 20 grains (**0·3 to 1·2 Gm.** Slipule No. 00 holds 10 grains.

May be suspended in an ounce of water by means of a drachm of mucilage of tragacanth or about 6 grains of compound powder of tragacanth. Prescribers should indicate if a suspending agent is required. A light variety of the substance needs no suspending agent.

5 $Bi_2O_3.Bi_2(CO_3)_3$ and $Bi_2O_2CO_3$—differing from the ordinary Carbonate—have been prepared.—P.J. ii./11,301.

The following forms an agreeable dose :—

Mistura Bismuthi. *Dose.*—1 ounce.

Bismuth Oxycarbonate 10 grains, Sodium Bicarbonate 10 grains, Mucilage of Tragacanth 1 drachm, Compound Tincture of Cardamoms 30 minims, Spirit of Chloroform 10 minims, Cinnamon Water to 1 ounce. **Tablets of Bismuth Carbonate** contain 5 grains, to be crushed and swallowed with a little water.

Ⓟ Mistura Bismuthi Astringens N. E. H.

Bismuth Carbonate 2 grains, Tannin 1½ grains, Aromatic Powder of Chalk with Opium 2 grains, Water 1 drachm. Dose for a child.

For X-ray Diagnosis of conditions of œsophagus and stomach large doses are frequently ordered.

'Standard' Opaque Meal.

Bismuth Carbonate 4 ounces, Lactose 1½ ounces, Water, *q.s.*, to make a thin emulsion—less than a tumblerful.—A. C. Jordan, B.M.J. ii./13,1348

'Homogeneous Bismuth Mixture.'—For use in radiography. 3⅓ ounces (100 Cc.) contains ⅔ ounce (20 Gm.) approximately.

Bismuth Carbonate 120, Gum Arabic 20, Tragacanth 5, Syrup 150, Water 350. Does not separate into two layers and hence give deceptive effect in radiography.—B.M.J.E. i./13,42.

For several reasons Bismuth Oxychloride is preferable. **Barium Sulphate** is also used *q.v.*

Gastritis is usually well treated by a dose of Bismuth Carbonate with a small dose of Morphine and 2 or 3 minims of Dilute Hydrocyanic Acid.—Whitla, Pract. Med.

In ulcerative colitis, Bismuth Carbonate 15 grains to the pint also Potassium Permanganate 1 in 30,000 useful and soothing. In the later stages irrigation with Perchloride 1 in 20,000, Zinc Sulphate 4 drachms in 3 pints and Silver Nitrate 5 to 10 grains to the pint, effectual when used alternately. Chlorodyne was beneficial as anodyne.—B.M.J. i./11, 864.

Intimately mixed with Liquid Paraffin it is stated to be better tolerated. In this way it is not attacked by the hydrochloric acid of the stomach.—A. Vicario, Jour. Pharm. Chim. 1914,9, p. 458.

Hyperacidity is well treated by powders containing Bismuth Carbonate 30 grains, Magnesium Carbonate 20 grains, and Sodium Bicarbonate 30 grains.—G. Rankin, B.M.J. i./15,1036.

An efficient mode of prescribing freshly precipitated Bismuth Carbonate is in the form of **Glycerinum Bismuthi Effervescens** *q.v.*

Ⓟ ✱**Sedeff.** (T.M. No. 204175). *Dose.*—1 to 2 drachms in water. Contains opium, bismuth and digestive ferments. A palatable granular effervescent preparation, for use in sickness and derangement of digestive functions.

Ⓟ **Pastillus Bismuthi Carbonatis** (3 grains) **cum Morphinæ Acetate** ($\frac{1}{40}$ grain), *v.* glyco-gelatin.

℞ ℙ1 **Collapsubes** (with rectal tube attachment) of Bismuth 20% Morphine $\frac{1}{2}$%, and Cocaine 3% Ointment,—**Unguentum Bismuthi Morphinæ et Cocainæ,** *Allingham,* with soft paraffin basis, are useful as an astringent in hæmorrhoids and for allaying irritation.

Liquor Bismuthi et Ammonii Citratis. *Syn.* **Liquor Bismuthi.** (*Off.*). *Dose.*—$\frac{1}{2}$ to 1 drachm (**2 to 4 Cc.**).

Is now prepared by interaction of Bismuth Subnitrate with Citric Acid and Water until the product is soluble in Ammonia, and then after washing dissolving in Ammonia. Contains (as B. P. '98) 5 grains of citrate = 3 grains of oxide of bismuth in 1 drachm. For some data as to manufacture. *see Vol. II.*

Flavoring.—Syl Lavandulæ, Syl Amygdalæ Amaræ ; Syrupus Aromaticus.

In following the B.P. directions the mixture of Bismuth Subnitrate, Citric Acid and water sets hard and is not completely soluble in ammonia.—F. Penfold suggests alteration of directions.—P.J. ii./16,567.

Evaporated to a syrup and spread on glass and dried it produces :—

Bismuthi et Ammonii Citras, U.S.

Dose.—2 to 5 grains (**0·12 to 0·3 Gm.**).

In soluble shining pearly or translucent scales. I Gm. yields not less than 0·46 or more than 0·52 Gm. Bi_2O_3.

Liquor Bismuthi Concentratus, B.P.C. (Double strength of Liquor *Off.*).

Dose.—15 to 30 minims (**1 to 2 Cc.**).

Dissolve Bismuth Subnitrate 14, with gentle heat in Nitric Acid (*Off.*). 10 previously diluted with an equal volume of water and add Citric Acid 10 dissolved in distilled water 14. Add gradually with stirring Sodium Bicarbonate 17·5 previously mixed with distilled water 14; wash the precipitate.

by decanting until free from nitrates and dissolve it by adding Solution of Ammonia 12 or *q.s.* Finally add Ammonium Citrate Solution 24 and make up to 100 with water.

Lithium Bismutho-Citrate.

Dose (suggested).—2 to 5 grains (**0·12 to 0·3 Gm.**), as also the analogous Potassium and Sodium Bismutho-Citrates, can be prepared by combining freshly precipitated Bismuth Citrate with hydroxides of the alkalis. The Lithium compound is stated to be useful as a gout remedy.—R. C. Cowley, C.D. i./13,212. *cf. Vol. II. under Liquor Bismuthi.*

✱ **Lac Bismuthi** (T.M. 15268). *Symes. Dose.*—1 to 2 drachms.

A preparation of Bismuth hydroxide. May be prescribed with hydrocyanic acid, alkalis, &c.

Ⓟ **Liquor Bismuthi Sedativus.** *Syn.* ✱**Bisedia.** (T.M. 252630) *Schacht.*

Dose.—1 drachm (**4 Cc.**) containing bismuth and pepsin with $\frac{1}{24}$ grain morphine hydrochloride, 2 minims of hydrocyanic acid, and 5 minims of tincture of nux vomica.

✱**Bismosal** (T.M. 314185). *Dose.*—$\frac{1}{2}$ to 1 drachm (**2 to 4 Cc.**). Children, 5 to 20 minims (**0·3 to 1·2 Cc.**). Contains Bismuth as hydroxide in suspension with Salol. In treatment of diarrhœa.

Bismuthi Citras, U.S. VIII. $BiC_6H_5O_7$=397·07. *Dose.*—2 to 5 grains (**0·12 to 0·3 Gm.**).

A white crystalline powder, yielding not less than 56 nor more than 58% pure Bismuth Oxide (U.S.). Insoluble in water and alcohol 90%, but soluble in ammonia. It is astringent and stomachic.

Bismuth Citrate prepared by usual methods is not $BiC_6H_5O_7$, but impure Monobismuthylcitric Acid $H_2C_6H_5O_7$ (BiO). Alkalis, apparently, do not form salts of this acid but more complex substances.—F. W. Adams, P.J. ii./24,87.

Bismuth Citrate Gauze.—Is advanced to replace Iodoform Gauze being non-toxic and without odour. May be left in uterine cavity at least five days and still be free from offensiveness. For use after curettings, in nasal and aural surgery and for burns. Strips, 1, 2 and 3 inches wide, are made, also 36 inches.—L. ii./10,1142.

Elixir Bismuthi—*Dose.*—1 drachm (**4 Cc**).

Bismuth Citrate 1, Distilled Water 6, Solution of Ammonia $\frac{3}{4}$ or *q.s.* Dissolve, filter and add Simple Elixir *q.s.* to 30.

Ⓟ **Mistura Bismuthi cum Pepsina.**—*Martindale.*

Dose.—1 to 2 drachms (**4 to 8 Cc.**) diluted.

Contains Bismuth Citrate 2 ounces, Pepsin (soluble) 320 grains, Morphine 5 grains, Strychnine 1½ grains, Dilute Hydrocyanic Acid 320 minims, Chloroform 30 minims, Saccharin Elixir 480 minims, Rosein Acetate *q.s.*, Water to one pint. This mixture will not deposit.

This preparation is retained as mixtures of this kind are frequently ordered, but the action of the Pepsin is seriously interfered with by the other ingredients. (*cf. our experiments with Pepsin. Vol. II. et infra.*).

G. J. Mackay, Austral. Jl. Ph., Jan., 1911, examined a number of proprietary Bismuth and Pepsin Solutions and found them devoid of proteolytic activity.

Tabellæ Bismuthi et Pepsinæ.

Bismuth Carbonate 3 grains, Pepsin 3 grains, in chocolate basis. Useful digestive. Compressed Tablets are also prepared.

Tablets Bismuth, Pepsin and Cascara.—*Martindale.*

Dose.—One or two as required after meals.

Bismuth Carbonate 3 grains, Pepsin 3 grains, Cascara Extract 1 grain. A useful digestive.

Bismuth and Pancreatin.—*Martindale.*

Dose.—1 to 2 drachms (**4 to 8 Cc.**).

An alkaline stimulant digestive combining the sedative properties of Bismuth with the pancreatic ferment in a compatible form, and being an *alkaline* solution the mixture will promote gastric secretion. The preparation is so compounded that the properties of the ferment are retained in an active condition. We have determined the peptonising power of the preparation after keeping 14 months, and found it to be as active as when first made. Our investigations have shown that Pepsin and Bismuth mixtures are mutually incompatible, —the activity of the ferment in such mixtures is interfered with by the necessary alkalinity of the Solution of Bismuth. Pepsin is only ready to do its work in a slightly acid solution (equivalent to the Hydrochloric Acid of the normal gastric juice). The alkalinity of Bismuth and the Hydrochloric Acid required with Pepsin are incompatible in a mixture, resulting in the precipitation of Bismuth Oxychloride, hence the more compatible Bismuth and Pancreatin.

The preparation has been found of particular service as a digestive in the irritated condition of the stomach during convalescence from illness.

℗ **Mistura Bismuthi Phenolis et Morphinæ.**

Dose.—1 ounce from 2 to 3 hours after every meal.

Bismuth Carbonate 40 grains, Phenol 2 grains, Solution of Morphine Hydrochloride 15 minims, Mucilage *q.s.*, Compound Gentian Infusian to 1 ounce.

Duodenal ulcer is relieved by this. For the constipation produced by large doses of Bismuth give **Pilulæ Hydrargyri Subchloridi, Rhei, Cascara et Capsicin.**—Guthrie Rankin.—B.M.J. ii./10,184.

Bismuthi et Cinchonidinæ Iodidum (short name '**Bisciniod**'—*Martindale*). $C_{19}H_{22}N_2O.HI+BiI_3=1010{\cdot}975$.

Dose.—$\frac{1}{6}$ to 1 grain (**0·01 to 0·06 Gm.**).

Yellowish red powder insoluble in ordinary solvents.

Manufactured by double decomposition of a soluble Cinchonidine salt with Bismuth and Potassium Iodide Solutions. It contains about 20% Bismuth, 40% each Iodine and Cinchonidine.

This substance, containing digestive, febrifuge and antiseptic constituents, should certainly find utility in therapeutics.

Bisciniod Suppositories.

Contain $\frac{1}{2}$ grain (0·03 Gm.) in Cacao Butter basis.

Magma Bismuthi, U.S. IX.

Dose.—Average, 1 drachm (**4 Cc.**).

A neutral thick suspension of Bismuth Hydroxide and Carbonate yielding on incineration 6% approx. of Bi_2O_3.

Bismuthi Nitras Crystallisatus, Fr. Cx. $Bi(NO_3)_3,5H_2O=484{\cdot}11$.

Dose.—5 to 10 grains (**0·3 to 0.6 Gm.**).

In colourless deliquescent crystals, which, if dissolved in a small quantity of water, give a solution with an acid reaction, this on further dilution throws out basic bismuth subnitrate. It is practically insoluble in Alcohol 90%, but soluble in cold Glycerin *cf.* Glycerinum Bismuthi Nitratis *infra.* It is astringent and antiseptic, and useful for the diarrhœa of phthisis.

Glycerinum Bismuthi Nitratis.

Bismuth Nitrate, in crystals 1, Glycerin to 4. Diluted 4 or 5 times with Glycerin is a stimulant application in eczema.

Glycerinum Bismuthi Effervescens (*Martindale*) may be prescribed thus:—

R. Glycerini Bismuthi Nitratis 4 ounces (or *q.s.*).

Eighty minims to be mixed with a solution made by dissolving *two* 5 grain Sodium Bicarbonate Tablets in 1 ounce (or more if preferred) of water (slightly warm in preference), stirred up and taken during effervescence. This gives a 10 grain dose of Bismuth Carbonate in a 'nascent' form. It is palatable and the carbon dioxide assists as a digestive.

Note.—Chemically, 10 grains of Bismuth Carbonate are produced by 12 grains of Bismuth Subnitrate and 4 grains of Sodium Bicarbonate, also 10 grains are formed by 20 grains of Bismuth Nitrate (Crystal) and 10 grains of Sodium Bicarbonate—approximately.

Bismuthi Oxidum, $Bi_2O_3=464$.

Dose.—5 to 20 grains (**0·3 to 1·2 Gm.**).

Is prepared by boiling bismuth subnitrate in solution of soda, washing and drying the deposited yellowish bismuth oxide. May with advantage be precipitated with acid from an alkaline solution containing glycerin.

Anderson's Ointment.

Bismuth Oxide 1, Oleic Acid 8, White Wax 3, White Soft Paraffin 9. In pruritus.

Bismuthi Oxychloridum, $BiOCl=259{\cdot}46$.

Dose.—5 to 20 grains (**0·3 to 1·2 Gm.**).

A non-irritant cosmetic powder, pearl white or '*blanc de perle.*' Given internally it produces a coating on the irritated parts of the stomach or bowels. As insufflation to the larynx ¼ to ½ gr.

Nascent Bismuth Oxychloride.

Pain and vomiting due to catarrh or organic disease of the stomach treated by Bismuth Oxychloride in fine suspension made in nascent state by using Liquor Bismuthi and Dilute Nitro-Hydrochloric Acid *q.s.* The mixture suggested is: Liq. Bismuthi 6 drachms, Dilute Nitro-Hydrochloric Acid 1½ drachms or *q.s.*, Peppermint Water to 6 ounces. One half ounce in water *t.d.* shortly before or after meals. (In dispensing, the acid is to be diluted and added last so as to throw out the Bismuth as a dense white cloud.—H. O. Nicholson, Pres., June, '20.

An **Oxybromide** is also made, with similar internal use.

Mucilago Bismuthi. **For "X" Ray Diagnosis.**

Bixmuth Oxychloride 1½ to 2 or 3 ounces or more made into a thick paste with Acacia Mucilage for a dose, for determining condition

of the œsophagus and for examining shape, position and motor function of the stomach. A special Bismuth Oxychloride *free from Nitrate* is made for " X " ray work. It is inert in the stomach.

Bismuth in Bread and Milk in proportion of 1½ ounces of Bismuth Oxychloride to ½ pint of bread and milk to form a thick paste—not a liquid—is also employed and is in some respects **more suitable.**

In tuberculous joints Bismuth injections are useful for diagnosis and treatment.

See also Bismuth Carbonate *antea* and Radiology Vol. II.

Pessaries or **Suppositories** may be made with Oil of Theobroma, containing 10 grains (**0·6 Gm.**).

Unguentum Bismuthi Oxychloridi.

Bismuth Oxychloride 1, Vaselin 15.

Is useful for anointing the speculum for vaginal examinations.

Unguentum Bismuthi Compositum, Plaistow.

Bismuth Oxychloride 2 drachms, Dilute Hydrocyanic Acid 20 minims, White Paraffin Ointment 1 ounce.

The **Oxyiodide** had been applied to ulcerating sores and injected in suspension, 1 in 100 of water for gonorrhœa; also as an ointment for rectal affections. Internally for ulcer of the stomach.

Bismuthi Salicylas, Bismuth Oxysalicylate, or Subsalicylate $C_6H_4.OH.COO.BiO = 361{\cdot}075$ (*Off.*). **U.S., Jap., P. Ital.** IV. **Helv.** (latter with method of making).

Dose.—5 to 20 grains (**0·3 to 1·2 Gm.**).

A white powder, insoluble in water, alcohol, and glycerin, yields on incineration about 64% of Bismuth Oxide. Has been used with advantage in some forms of diarrhœa, typhoid fever and gastric catarrh, and as a substitute for iodoform. A good intestinal antiseptic.

For Notes on Chemical Examination see Vol. II.

Tablets, 5 grains (**0·3 Gm.**). *Dose.*—1 to 4.

Suppositories of Bismuth Salicylate, 10 grains.

A useful astringent in dysentery.

Bismuthum Subsalicylicum, Basic (Fr. Cx.).

$C_6H_4.OH.COO.Bi(OH)_2 = 379{\cdot}091.$

Dose.—5 to 20 grains (**0·3 to 1·2 Gm.**).

An amorphous anhydrous insoluble white powder neutral to Litmus, incompatible with Acids. To prepare, warm without boiling Hydrated Bismuth Oxide (*q.v.*) 158 or as much as corresponds to 150 Gm. Bi_2O_3 with Salicylic Acid 100 previously mixed with water 1,000. The mixture should be finally slightly acid. After cooling collect and wash rapidly, and dry at not exceeding 80° C. In an experimental quantity which we prepared we found a distinct proportion of free Salicylic Acid.

Bismuthi et Cerii Salicylas.

Dose.—5 to 20 grains (**0·3 to 1·2 Gm.**).

For sickness, diarrhœa, dysentery, and ulceration of the bowels.

Lac Bismuthi et Cerii is sold as a speciality.

Dose.—One to two drachms.

Bismuthi Sulphocarbolas *vel* **Sulphophenas.**

Dose.—4 to 8 grains (**0·25 to 0·5 Gm.**). in cachets.

A red-tinted slightly soluble powder used in intestinal affections.

Bismuthi Subnitras, Bismuth Oxynitrate, Magisterium Bismuth, *Off.*, **Ph. Ned.**, P. Helv. P. Ital., $Bi\,ONO_3\,H_2O = 304\,024$.

Dose.—5 to 20 grains (**0·3 to 1·2 Gm.**).

P. Jap. gives method of making—*i.e.*, Bismuth 1, Nitric Acid (1.2 Sp. Gr.) 5, solve and allow to crystallise, then take the crystals 1, water 4, and add boiling water 21. Pour off, wash with water 25, and dry at 30° C.

Yields (*Off.*, P. Jap. and P. Ital.) 79 to 82% Bi_2O_3.

For pharmaceutical purposes it is usually $6Bi_2O_3.5N_2O_5.9H_2O$ (79·8% Bi_2O_3).—C. E. Corfield and G. Short, P.J. ii./24,80.

Incompatible with alkaline carbonates, also decomposes Potassium Iodide, and incompatible with Tannin and Sulphur.

Best suspended in aqueous vehicle by Compound Tragacanth Powder, 1 drachm to 8 ounces, or by powdered Gum Acacia. Or may be intimately mixed with Liquid Paraffin. This avoids decomposition into nitrite in the stomach. *cf.* Bismuth Carbonate.

Uses.—In gastric ulcer and dysentery as an intestinal antiseptic, and occasionally as a dusting powder in eye work. During the war it was much used to wounds in the form of 'B.I.P.P.'

Gastric ulcer well treated by Bismuth Subnitrate rubbed into a paste with Liquid Paraffin. This is a good vehicle for Bismuth, undoing its constipating effect.—L. J. Picton, B.M.J. ii./17,617.

As a dusting powder for wounds it has caused poisoning.

Injectio Bismuthi Subnitratis.—Beck's Bismuth Paste. For 'X' Ray Examination of fistulæ. (*cf.* also Bismuth Oxychloride).

(*a*) For Diagnosis and Early Treatment.—Bismuth Subnitrate 1 is slowly stirred into hot melted Vaselin 2.

(*b*) For Late Treatment.—Bismuth Subnitrate 6, White Wax 1, Hard Paraffin 1, (M. pt. 120° F.), Vaselin 12. Mix while boiling. Sometimes 1% Formalin is added.

The (*a*) form was originally injected to diagnose the extent of chronic tuberculous sinuses. It was found in addition, however, to have marked curative effect. Injections with a glass syringe are made after melting and mixing. The syringe must be sterilised dry, and the plunger dipped in sterile oil before charging.—Beck, 'Fistulous Tracts, Tuberculous Sinuses and Abscess Cavities.'

Modifications have been introduced, *e.g.*, the following which is in use by London surgeons:—Bismuth Oxychloride 1, Vaselin 1½, Liquid Paraffin 1½, for injection into sinuses.

By 'X' Ray examination sinuses so injected can be localised. When employed for diagnostic purposes with subsequent immediate operation there is no danger, but large quantities should not be left *in situ*.

Three ounces of (a) injected at the knee, and later 4 ounces further caused obvious poisonous effects. Caution is necessary when using for diagnostic purposes.

The action of the Bismuth is thought to be bactericidal, chemotactic and astringent. Mechanical action of the paste is also good.

Pasta Bismuthi et Iodoformi. *Syn.* **"B.I.P.P."**

Mix Bismuth Subnitrate 1, and Iodoform 2, and stir in Liquid Paraffin 1 or *q.s.* to soft butter or cream consistence, and finally rub down on a slab with a spatula.

The Bismuth Subnitrate and the Iodoform may be sterilised by dry heat at 120° C. for ½ hour. A Paraffin Base of composition: Paraffin melting point 45° C. 19 parts, and Liquid Paraffin (Sp. Gr.

880) 40 parts suggested when making a *soft* "B.I.P.P." — S. Dunstan, B.M.J. ii./17,505.

In dressing a wound (i.) clean the skin and surrounding area with gauze wrung out of 1 in 20 Carbolic Lotion—usually under open ether anæsthesia.

(ii.) Open the wound freely and, if possible, sufficiently to inspect the cavity and cleanse with dry sterile gauze mops, using a Volkmann's Spoon, and remove foreign bodies.

(iii.) Mop out with cotton-wool mops soaked in Spirit and dry.

(iv.) Fill up with "B.I.P.P." by drawing backwards and forwards through the track of the wound strips of gauze covered with the paste. Remove all excess, leaving only a thin covering over the wounded surface. Dress with sterile gauze and cover with an absorbent pad which is held, if possible, with sticking plaster and bandage. This requires no change for days or weeks if patient is free from pain. If discharge comes through, the stained part must be soaked in spirit and a gauze dressing wrung out of the same applied as a further covering.

(v.) In redressing, the wound is covered with a dossil of wool soaked in spirit and the sticky, dirty-looking discharge is wiped off the surrounding skin until it is clean.

For fresh wounds, when infective gangrene is still a serious possibility, free drainage must be employed. There is little danger of Iodoform poisoning. In 40 cases there was no need to change a dressing sooner than intended. Except in head wounds, no spread of septic infection, no cellulitis nor abscess formation. The method makes possible the healing by first intention under infrequent dressings. Acute abscesses opened, cleaned, filled with "B.I.P.P.," and closed by interrupted sutures can heal by first intention without further pus formation. It appears safe to plate compound fractures by the method described.—Rutherford Morison, L. ii./16,268.

Since the advent of "B.I.P.P." it has been possible to treat large infected wounds in such a way that they require no special drainage, that they can be safely closed by sutures at any period of their progress, and the dressings used for them can be left on from one to six weeks with a knowledge that they are making steady progress. To avoid risk of Bismuth or Iodoform poisoning *smear the surface of the wounds* and rub in "B.I.P.P.," *removing any excess.*

The fresher the wound is the better it reacts to the treatment. Wounds have been closed without tube or other drainage than is allowed for between *interrupted* sutures, not too close together. From these the bacteriologist has cultivated *B. Perfringens*, *Tetanus* and a variety of other anaerobic organisms, but the results have always been good.

Thick sterile silk sutures rubbed all over with "B.I.P.P." are better than silkworm-gut.

Compound fractures of all the bones can be treated with as great ease as simple fractures. Cases of compound fracture of ankle, gun-shot and other wounds well reported on.—Rutherford Morison, B.M.J. ii./17,503.

It combines a maximum amount of rest to the wound, a persistent storage of inhibitory antiseptic and a minimum amount of attention but is not free from risks.—Sir G. H. Makins—Hunterian Oration B.M.J. i./17,216; L. i./17, 252.

See also "**Wounds.**"—Therapeutic Index.

Enema Bismuthi et Sodii Salicylatis.

Bismuth Subnitrate 3 drachms, Sodium Salicylate 2½ drachms, Psyllium Seed Mucilage to 1 pint.

Colitis, the treatment of, by Revelliod's method (modified).

Empty the bowels by enemata of warm water twice daily for three days—on the fourth day inject the above. Action of the bowels must be discouraged after the injection as the medicament should be retained for two days, if possible, to permit of absorption.

During the injection the patient should lie upon the left side with the pelvis raised 2 or 3 inches. This treatment has of course no effect upon enteritis alone or complicating (? originating) colitis; consequently a modification is necessary.

Pilula Bismuthi-Sodii Salicylatis cum Salol.

Syn. Compound Bismuth Pill.

Dose.—Two immediately after each of 6 consecutive meals, then discontinue for two days and repeat in the same manner.

This pill contains in the centre, Bismuth Carbonate 2½ grains, coated thinly with Gelatin and around this is a layer of Sodium Salicylate 2 grains, covered finally with Salol 1½, 2½ or 3 grains, or as desired (*the Salol to be applied pure by means of heat only*).

It has been devised to ensure its reaching the part of the intestine affected by the catarrh. It is coated with acid resisting material and it dissociates on meeting the alkaline intestinal juice. The coating of Salol is varied in thickness according to the distance from the pylorus the physician may determine the beginning of the catarrhal state to be. While 1½ grains of Salol permits the medicaments to reach the junction (approximately) of the upper and middle thirds of the ileum, 4 grains will, in a large proportion of cases, carry the pill through the whole length of the intestines and cause it to be discharged with the fæces. The well-known coating effect of the Bismuth Carbonate on the inflamed mucous surfaces is enhanced by the properties of the Sodium Salicylate. The Bismuth remains *in situ* for from 8–10 days.—Craik Taylor.

Bismuth Subnitrate Tablets, are made 5 to 10 grains.

℞ ℙ **Pulvis Bismuthi Compositus.** *Syn.* Insufflatio Bismuthi et Morphinæ. Ferrier's Snuff.

Morphine Hydrochloride 1, Powdered Acacia 60, Bismuth Subnitrate 180.

From 1 to 3 drachms to be used as snuff in 24 hours for catarrh. For acute coryza, add powdered cubebs. It may cause drowsiness for some hours in susceptible patients.

℗ **L. H.** calls Ferrier's Snuff **Pulvis Bismuthi cum Morphina**, and has Pulvis Bismuthi Compositus as an Antidyspeptic Powder (*Dose* 1 drachm) of Bismuth Carbonate, Heavy Magnesium Carbonate, Sodium Bicarbonate, of each 1.

Bismuthi Oxy-Iodogallas. **P. Jap. IV. P. Helv.**

$C_6H_2(OH)_3COOBi.OH.I = 520{\cdot}803$.

✱Airol, T.M. 181257 of 1894. Renewed 1922. *Syns.* Airoform, Airogen.

Manufacture (From Patent specification). Bismuth oxyiodide derived from 9·5 Kilos of Cryst. Bismuth Nitrate is washed and stirred with water. 3·4 Kilos Gallic Acid are added until red colour changes to greyish-green. Collect, wash and dry at moderate heat. Or, Bismuth Gallate (Dermatol) 10 kilos are treated under heating with 3·1 kilos of Hydriodic Acid until of green colour. Wash and dry.—***Expired.***

A light greyish-green powder, odourless, non-irritant. Used as ointment for ulcers, boils, whitlows, chancres, and intertrigo. Also as dusting powder, *e.g.*, for gonorrhœal ophthalmia.

Suppositoria Hæmorrhoidalia.
Bismuth oxyiodogallate 6, Resorcin 1·5, Zinc Oxide 6, Balsam of Peru 1·5, Yellow Beeswax 0·0075, Sesame oil 1·5, Oil of theobroma 19 Gm. Divide into twelve suppositories.
A formula of the "Specialities" Committee of the "Nederlandsche Maatschappij ter Bevordering der Pharmacie" 1914.—C.D., July 25, i./14.

Sanusin ✱Sempules (T.M. 329438) contain Resorcin, Boric Acid, Balsam Peru, Zinc and Bismuth Carbonate—useful in treatment of hæmorrhoids.

Bismuthi Subgallas, $C_6H_2.(OH)_3CO.O.(BiO), H_2O$ or $Bi(OH)_2C_7H_5O_5$ =411·091 *Syn.* ✱DERMATOL; U.S. 52–57% Bi_2O_3. P. JAP. and P. HELV. GALLATE DE BISMUTH. FR. CX. 56·45% Bi_2O_3 (with directions for making).

PATENT 6234 of 1891 became void in the 11th year. Now public property. ✱DERMATOL (T.M. 215949/1899).

Manufacture.—May be prepared according to our investigations in several different ways:—(1) By mixing the freshly precipitated Hydroxide obtained from Bismuth Nitrate (crystal) 484 with Gallic Acid 188, dissolved in warm Alcohol, and warming the mixture until the colour is light yellow and the supernatant liquor is hardly acid. Collect and wash with lukewarm water. (2) By using Bismuth Carbonate 258, Gallic Acid 188, and Water 2,000, heating until interaction has occurred, or (3) By using Bismuth Subnitrate 304, in place of the Carbonate. In this case the Gallic Acid must be used as Sodium salt.

On the whole we find the No. (2) method is best. The colour is lemon yellow and the Bi_2O_3 content we found approximates theory —56·4%.—W. H. M., 1917.

The FR. CX. method is also satisfactory: Dissolve Bismuth Nitrate *Cryst.* 100 Gm. in Glacial Acetic Acid 200 Gm. Dilute with water 500 Cc. and add with stirring Gallic Acid 37 dissolved in water 1,500 Cc. Wash the p.p. until the liquor is no longer acid to litmus. Dry at not exceeding 60° C.

Average dose (U.S.)—8 grains (**0·5 Gm.**).

An odourless, yellow, insoluble, non-irritant antiseptic dusting powder, employed alone or with starch.

Incompatible with alkaline sulphur compounds.

Given internally for diarrhœa in doses of 30 to 90 grains daily. Emulsion of Bismuth Subgallate 2, Gum Acacia 2, Water 25, has been used in gonorrhœa, with good results.

In ulcerative colitis an emulsion may be used to adhere to the mucosa; also of value after pile operations. Promotes healing.—W. S. Handley.

Collapsubes, with catheter attachment, of **Bismuth Subgallate Ointment, 10%,** with paraffin basis, are useful in gonorrhœa: this ointment is also good for burns and eczema.

Carbassus Bismuthi Subgallatis. BISMUTH SUBGALLATE GAUZE.
To prepare, use an emulsion of Bismuth Subgallate, ½ to 1 of Glycerin to 2 of Alcohol (90%) and proceed in the customary manner (*cf.* Sterilised Dressings)—the final strength being 10 to 20% of the Bismuth in the gauze as required. For packing cavities.

Bismuthi Tannas. *Dose.*—10 to 30 grains (**0·6 to 2 Gm.**).

A yellow powder insoluble in water, is astringent, and useful in diarrhœa and dysentery. F.N. 1911 and P. HUNG. give method of making.

Bismutose (*cf.* German patent 117269). *Dose.*—15 to 30 grains for children, adults by the teaspoonful. A compound containing about 20% of bismuth with 60% of albumen; useful in gastric ailments.

Naphthol-Bismuth. BASIC BISMUTH BETA-NAPHTHOLATE.

$Bi_2O_2(OH)C_{10}H_7O = 608{\cdot}114$.

Syn. ✱ORPHOL. TRADE MARK 190732.

PATENT 13291/1892 and 15361/1894. The first remained in force the entire period. The second became void in the 7th year. Now public property. U.S. Patent is 516358/1894.

Dose.—10 to 30 grains (**0·6 to 2 Gm.**).

Manufacture.—One of the patent examples speaks of the use of Beta Naphthol 14·5 kilos, Caustic Soda 4 kilos, and Bismuth Nitrate 12 kilos on the lines of the Xeroform patent. The method does not give satisfaction.

We have made a compound of this kind by interaction of a Sodium Naphtholate solution made with Beta Naphthol 144 (one molecule) and Sodium Hydrate 120 (3 molecules) with Bismuth Citrate 397 (one molecule) in the form of a paste with water.

This method produces a light buff coloured powder, which gave on ignition approx. 80% Bismuth Oxide. Theory demands 76·3%.

A useful antiseptic to the stomach and intestines, astringent.

Phenol-Bismuth.

Dose.—10 to 30 grains (**0·6 to 2 Gm.**).

Preparation:—

The method advised is to dissolve Bismuth Oxynitrate 60, in 70% Nitric Acid 45, diluted with water 150, and to add this very slowly to Sodium Hydroxide 42 and Phenol 20 in water 750 with stirring and wash with cold water. The body obtained yielded on analysis 14·76% Phenol and 81·93% Bismuth Oxide. The exact formula of the compound is therefore uncertain. Products with the highest Phenol content are obtained by precipitation from neutral solution in the cold. The figures do not agree with $Bi(OH)_2C_6H_5O$.—C. E. Corfield and G. R. Boyes, P.J. i./21,483.

A white powder, insoluble, containing about 20% of phenol, combined with bismuth oxide. Acts slowly on the digestive tract and does not cause carboluria. Has a similar action to last preparation.

Pyrogallol-Bismuth. $C_6H_3{<}^{(OH)_2}_{O.BiO}$ or

$C_6H_3(OH)O_2BiOH = 349{\cdot}070$ has internal action similar to Salol.

Dose.—2 to 8 grains (**0·12 to 0·5 Gm.**).

ALKALI BISMUTHYL TARTRATES

And allied preparations for Injection in Syphilis.

Chemical Composition and Manufacture:—

Considerable confusion surrounds these compounds, caused in part by the rather discursive and non-precise French literature and in part by incorrect translation into English. Some manufacturers, in following up the work of Sazerac and Levaditi, describe

their compound as Sodium-Potassium-Bismuthyl Tartrate, attributing to it a definite formula, some include a 'BiO' radical, indicating an analogue of Tartar Emetic, some issue it in scale form —which amounts to a direct admission that it is not a definite body, some have it in the form of powder, and so on.

Alkali Bismuthyl Tartrates used medicinally at the present may be roughly divided into two classes, according to the method of their manufacture and medicinal use. (*cf.* Corfield and Adams, P.J. ii./23,82.)

(1) "NEUTRAL" compounds, usually termed '**Bismuthyl Tartrates**' or '**Tartrobismuthates,**' which are either soluble or insoluble in water, and are used for injection in protozoal diseases. They are prepared by dissolving Bismuth Oxy-Tartrate in alkali, the Alkali Bismuthyl Tartrate being obtained as a powder by evaporation or by precipitation with Alcohol.

(2) "ACID" preparations, frequently described as 'Bismuth Tartrate Soluble,' usually occur as colourless scales, which give an acid solution in water; these are employed with Pepsin for digestive complaints. They are obtained by treating Bismuth Hydroxide with a solution of the alkali acid tartrate, filtering and evaporating.

Sodium Bismuthyl Tartrate, Neutral. *Syn.* SODIUM TARTROBISMUTHATE. ***For Injection.***

Dose.—As for Sodium Potassium Bismuthyl Tartrate *postea.*

Manufacture.—Bismuth Oxytartrate is first prepared by the method of R. C. Cowley (C.D. i./13,312). Dissolve Bismuth Subnitrate 70 Gm. in Nitric Acid (Sp. Gr. 1·42) 57 Cc. diluted with an equal volume of water, add Sodio-Potassium Tartrate 64·5 Gm. dissolved in a little water, then Sodium Bicarbonate 57 Gm., also in solution. Heat to drive off CO_2. Filter and thoroughly wash the precipitate of Bismuth Oxytartrate.

This, we find, gives a product which, when dried, contains only about $\frac{1}{2}$% of Bismuth Subnitrate and has a Bismuth content of about 57%, corresponding to the formula $Bi_2O\ (C_4H_4O_6)_2$. The washed precipitate of Bismuth Oxytartrate is dissolved in 115 Cc. of 2 N/1 NaOH and the solution, after filtration, we find is best run into fifteen times its volume of 95% Alcohol to precipitate the compound. The precipitate is collected and dried at 50° C.

We find on analysis that the substance so prepared corresponds approximately to the formula $C_4H_4O_6\ (BiO)\ Na$, but this agreement seems to be only accidental, since the composition of the product can be altered by varying the strength of Alcohol used for precipitation. Thus it seems probable that the substance is in reality either more complex, or else a mixture of several compounds. Other workers have arrived at a similar conclusion.

R. C. Cowley (*loc. cit.*) dissolves the Bismuth Oxytartrate in normal Caustic Soda, evaporates and scales. On experimenting, we find the Alcohol precipitation preferable, since evaporation gives an

insoluble product, which only gives a clear solution on the addition of a little more alkali.

The compound occurs as a white powder, ***soluble*** 1 in 6 parts of water, giving a nearly neutral solution, and containing about 53% of Bismuth.

Uses.—These are included under Sodium-Potassium Bismuthyl Tartrate.

Sodium Bismuth Tartrate, Acid. *Syn.* BISMUTH TARTRATE SOLUBLE.

Dose.—2 to 5 grains (**0·12** to **0·3 Gm.**) *per os*.

Manufacture.—This substance is formed by either hot or cold digestion of freshly precipitated Bismuth Hydroxide with a solution of Sodium Acid Tartrate, the solution being filtered and scaled. In no case could a neutral compound analogous with Tartar Emetic be isolated, the resulting preparation always contains Sodium Acid Tartrate. It is usually obtained in the form of colourless scales which give an acid solution in water. Commercial samples examined contained from 30—45% of Bismuth, and from 15—25% of Sodium Acid Tartrate, calculated from the acidity. A compound of this kind is, we find, compatible in moderate amount with Pepsin (*vide Vol. II.*).

Uses.—For digestive complaints, in conjunction with Pepsin, the acid solution favouring the action of the enzyme.

Liquor Bismuthi Tartratis.

Dose.—½ to 1 drachm (**2** to **4 Cc.**).

Dissolve Bismuth Tartrate Soluble 1040 grains, in water 10 ounces, and Chloroform 20 minims, in Alcohol 40 minims, mix and make up to 20 ounces.—T. D. Morson and J. Harpham, C.D. ii./12,947.

Potassium Bismuthyl Tartrates.

These are similar to the corresponding Sodium salts and are prepared by similar methods.

'Neutral' Potassium Bismuthyl Tartrate is a white soluble powder containing about 50% of Bismuth.

'Acid' Potassium Bismuthyl Tartrate is obtainable in the form of colourless scales containing about 38% of Bismuth, and acidity equivalent to 10 to 15% of Potassium Acid Tartrate.

Sodium Potassium Bismuthyl Tartrate. *Syn.* SODIUM POTASSIUM TARTROBISMUTHATE.

This substance occurs almost exclusively in the form of the water soluble, neutral preparation used for injection purposes.

Dose.—3 grains (**0·2 Gm.**) *intramuscularly* every 3 or 4 days, repeated until a total of 2 to 3 Gm. has been given. (The compound is given in 10% suspension in Olive Oil.) Subsequently a single weekly injection of 0·2 to 0·3 Gm. may be given, or the treatment may be suspended for a month and then started again, if necessary.

Manufacture.—Commercial samples which we have examined show a considerable variation in the Bismuth content, ranging

from 30 to 60%. By dissolving Bismuth Oxytartrate in a 2 N/1 solution of equimolecular parts of Caustic Soda and Potash with subsequent precipitation with Alcohol as described under Sodium Bismuthyl Tartrate, a preparation is obtained containing about 50—52% of Bismuth. The above method appears to give substances which are nearly uniform as regards Bismuth content, but as in the case of the corresponding Sodium Bismuthyl Tartrate the products are probably a mixture of complex compounds.

A white powder, ***soluble*** about 1 in 2 parts of water, giving a neutral solution.

Uses.—*This,* according to some authorities, is the compound which is to be used in syphilis, but in all probability the difference in effect between a Sodium Bismuth Tartrate and a body containing also Potassium is negligible.

Pharmacology.—Sazerac and Levaditi made experiments on rabbits in the treatment of experimental syphilis employing the compound made according to Cowley's formula. They found a dose of 0·01 Gm. per kilo intramuscularly caused disappearance of the treponema. This, of the various compounds tried (Bismuth Citrate, Lactate, Subgallate, etc.) gave the speediest results. Therapeutically, the treponema disappeared from a chancre after the second injection, with subsequent healing. In the secondary stage, eruptions or mucous patches clear up quickly. Very favourable results have been obtained in the tertiary stage.—Jl. des Praticiens, Feb. '22, per Pr.

The compound in various forms has been considerably employed both abroad and in this country.

Caution. *Bismuth preparations, in general, are apt to cause gingivitis and stomatitis. Care must be taken with the mouth.*

The drawbacks of Bismuth medication are :—

(1) Local pain; avoided by use of suitable preparations and careful technique.

(2) Effects on the skin and mucous membrane, such as stomatitis, which are however uncommon.

(3) Effects on digestive tract and kidneys, such as colitis and nephritis, have occasionally been reported.

(4) General effects, such as headache and depression.

It is not advisable that Bismuth should replace Arsenic in all cases, being specially indicated in cases resistant to, or intolerant of, Arsenic. Authors recommend a combined treatment with Arsenic and Bismuth, giving Mercury an accessory position.—Emory and Morin, Paris Med. Dec. 22, 509, per Pres. Feb. '23. The urine should be watched during treatment.—B.M.J.E. ii./22,58. Bismuth Compounds contraindicated in heart disease, being liable to induce weakness and irregularity of action.—per Pres. Jan. '24,57.

Further References.

Cowley's compound in 10% suspension in Olive Oil employed. Dose intramuscularly 2 to 3 Cc. Soluble salts are at least 10 *times as toxic* when given *intravenously* as when given *intramuscularly.* Liquor Bismuthi et Ammon. Cit. B.P. 0·5 or 1 Cc. subcutaneously had no general effect, but on repetition a black line formed on the gums with sometimes a stomatitis. *Subcutaneous* injections are in general less safe than *intramuscular.* Intravenous injection,

especially with 2 Cc., gave signs of poisoning, nausea and copious diuresis.—H. B. Day, L. ii./22,328.

Curative action of Bismuth Sodium Tartrate and Bismuth Potassium Tartrate. The compound suspended in oil. *Intramuscular* injections to be given, not hypodermic or intravenous. Wasserman reaction affected in a percentage of cases. Dose 0·2 Gm. every other day or 0·3 Gm. every three days. Total dose 1 to 1½ Gm. Stomatitis seen, but milder than Mercurial.—Sazerac and Levaditi, B.M.J.E. i./22,9. See also B.M.J. i./22,443.

The Bismuth is widely distributed and rapidly eliminated. **Wasserman Reaction** is changed.—L. i./23,39.

YAWS in Kenya Colony well treated.—R. Howard, T. Roy. S. Trop. Med., Mar./23,437.

PREPARATIONS OF COMMERCE:—

'Bismutol' Sterules contain 3 grains (**0·2 Gm.**) of SODIUM POTASSIUM BISMUTHYL TARTRATE in **2 Cc.** (30 minims) of sterile Olive Oil. For use intramuscularly.

A Sodium Potassium Tartrobismuthate containing approximately 50% Bismuth and giving a neutral aqueous solution.

Alternatively 1 Cc. doses of 10% aqueous solution may be employed every 2 or 3 days—the course being 10 to 20 injections.

***Trépol** (T.M. 187470). Described as 'Sodium and Potassium Tartrobismuthate,' containing 64% of Bismuth. *Dose.*—Intramuscularly 2 Cc. (=**0·2 Gm.** of the compound in oily suspension) every 3 or 4 days until a total of 2·8 or 3 Gm. is reached.

Said to cause rapid disappearance of the spirochætes in syphilitic chancres and healing of lesions in 6 to 20 days.—L. i./22,1001.

Good effects from intragluteal injections twice weekly of 1 to 2 Cc. of the 10% emulsion.—B.M.J.E. ii./22,73.

(**Neo-trépol** consists of *metallic* Bismuth in suspension in a sterile isotonic solution. Given intramuscularly in doses of 1·5 to 2 Cc. every 3 or 4 days.—C. Levaditi, L. i./23,639).

Bismuthyl is a similar preparation in 10% suspension in a glucose medium. *Dose.*—2 Cc. intramuscularly every 5 days until 12 to 15 doses have been given.

***Luatol** (T.M. 424118). *Syn.* Sodium Potassium Bismuthyl Tartrate.

Dose.—1 Cc. of the aqueous solution containing 0·1 Gm. of the compound repeated every 2 days. A course consists of a series of injections of from 10 to 20 Cc. Alternatively, 2 Cc. may be given at one time, but in this case injections should only be repeated after 4 or 5 days. The preparation is also given suspended in oil. For the first 3 injections 3 Cc. of a 10% suspension are used, and for the 3 following, the dose is to be reduced to 2 Cc. per injection. Injection, in this instance, is given on an average every 4 days. If required, the treatment may be continued at the rate of one injection of 2 Cc. every 6 days, until healing of the lesions is obtained, or until Wasserman Reaction is negative. A further series of injections can be made after an interval of one month.

Ampoules of the last four are made for intramuscular injection.

Tartro-Bi is described as a 10% aqueous solution of Sodium-Bismuth-Tartrate with the composition

$$\left[\begin{array}{ll} \text{CHOH.COONa} & \text{CHOH.COONa} \\ \text{CHOH.COOBiO} & \text{CHOH.COONa} \end{array}\right]$$

1 Cc. contains 0·035 Gm. of Bismuth in clear neutral solution. For *intravenous* use to produce rapid effect.

1st day.—Give ½ Cc. intravenously to ascertain how the preparation is tolerated. If the injection is well supported give on the
3rd–7th day—1 Cc. each day intravenously.
8th–10th ,, —Interval.
11th–14th ,, —1 Cc. each day intravenously.
15th–19th ,, —Interval.
20th–21st ,, —1 Cc. each day intravenously.
This course is stated to kill the spirochetes in the blood stream without symptoms of poisoning appearing. Pain in the jaws which sometimes occurs immediately after injection is of a temporary nature only and can be relieved by a hot mouth wash.

Oleo-Bi. A preparation in 2 Cc. ampoules containing 0·1 Gm. Bismuth in the form of Bismuth Oleate (25%).
In syphilis 1 to 2 Cc. two or three times a week given deeply into the upper quarter of the gluteal muscle. 12 to 20 injections constitute a course.

Bismuthi Tartras.—$Bi_2(C_4H_4O_6)_3+6H_2O=968{\cdot}252$.
This compound is described in the literature as being prepared by adding a concentrated warm solution of 4 parts of Tartaric Acid to a moderately concentrated solution of 5 parts of Bismuth Oxide in Nitric Acid. It is a true Tartrate—being insoluble it is relatively little used.

R. C. Cowley writes us : " I have not been able to prepare a Bismuth Tartrate in conformity to the formula $Bi_2(C_4H_4O_6)_3$ that will make a clear solution with Ammonia."

Bismuth Tartrate prepared by ordinary methods of combination appears to be a mixture of the oxytartrates $Bi_2O_2(C_4H_4O_6)$ and $Bi_2O(C_4H_4O_6)_2$.

Bismuthum Hydroxydatum, Hydrated Bismuth Oxide. Fr. Cx.
BiO.OH.=241·008, *i.e.*, 1 molecule Bismuth Oxide containing the elements of ½ molecule water (3·73%).—Fr. Cx. Using theoretically 1 molecule of Bi_2O_3 and 1 molecule of water, one obtains 2 molecules of the above Hydrated Oxide. The Tri-hydrate $Bi(OH)_3$ is precipitated, which on drying at 100° C. decomposes into the monohydrate :—

$$Bi(OH)_3 = Bi\,O.OH + H_2O$$

Dose.—5 to 20 grains (**0·3 to 1·2 Gm.**).
An amorphous white insoluble powder, but soluble in Sulphuric Acid and Hydrochloric Acid in presence of water and in fixed alkalis in presence of Glycerin. Permanent in the air.
Shake Glycerin 150 Gm. with Bismuth Nitrate (cryst.) 100 Gm. add Water 100 Cc. in portions, shaking constantly to prevent formation of the Subnitrate. When dissolved filter if not clear, and pour the liquid, a little at a time, into a mixture of water 150 and 10% Potash Solution 850 Gm. When reaction complete add drop by drop Dilute Sulphuric Acid 100 Gm. (10% approx.—Fr. Cx.) mixed with its weight of water to neutralise, then render the mixture slightly alkaline. Wash the precipitate by decanting until a sample of the wash liquor leaves nothing on evaporation. Collect and dry at 100° C.
Employed in making Basic Bismuth Salicylate.
In an experimental quantity we obtained 45 Gm. of product from above quantities. The theoretical amount is 50% approximately

Uses.—A substitute for bismuth carbonate.

***Muthanol** (T.M. 426043).

Dose.—First Treatment. Series of ten injections are given, each series being followed by ten days' rest, this treatment to be continued until specific lesions have disappeared and the Wassermann Reaction is negative.

Protective treatment. When the above two results are obtained, a further treatment of two years duration should be given as follows :—

First and Second Year A series every 4 months.
Third Year .. .. A series every 6 months.

A suspension of radioactivated Bismuth Oxide in sterile oil.

Following on the 'Tartrate' method of Bismuth administration, a number of cases of syphilis, chancre and secondary stages, treated with this compound (published by Fourcade, Jaloustre and Lemay) showed success. It is thought its simplicity is an advantage. Bismuth Oxide contains more Bismuth than the organic compounds. Further, that all the organic compounds operate in the tissues as Bismuth Oxide, into which they are first changed. The radio-activation of the Bismuth with a minute quantity of Mesothorium Bromide as in Muthanol, is thought to be of special utility, acting as a catalysator. The addition is viewed as rational, as the last member of the Thorium degradation products is Bismuth. Rapid disappearance of the spirillum from the surface of chancres, cicatrisation of lesions, absence of retrogression and good effect on the Wasserman Reaction are reported. There appear to be no contra-indications and according to Fourcade (Mar., 1922) it is a good anti-syphilitic.

Muthanol Ampoules 2 Cc. contain a 0·15 Gm. Bismuth Oxide.

Muthanol Suppositories containing 0·2 Gm. Bismuth Oxide in each are also made for alternative treatment.

"X" Ray pictures taken after intramuscular injections of Huile Grise and Bismuth Hydroxide suspensions (Muthanol), showed that the first mentioned is very slowly absorbed and that it leaves persistent traces in the tissues for months. The insoluble Bismuth compounds are much more quickly absorbed and hence should be preferred. The pictures showed that the Bismuth appears in the form of striæ, while the Huile Grise is in the form of plaques.—Lévy-Bing and co-workers, Ext. des Annales des Mal. Vénér., No. 12, Dec. 1922. (The preparation was originally the Hydroxide—altered subsequently to the oxide).

✱ **Bi-Quinyl** (T.M. 440714). A double Iodide of Quinine and Bismuth.

Dose.—Each ampoule contains 0·3 Gm. of the compound in 3 Cc. of oil. Adult dose, one ampoule every 3 days up to 15 or 20 injections. This constitutes a course of treatment, to be repeated after intervals of 10 days.

The combination of Quinine and Iodine with the Bismuth is thought to enhance the spirillocide action.

✱ **Krebisote** (T.M. 306503). Probable approximate composition $C_6H_3(CH_3)(OCH_3)O.Bi(OH)_2$.

Dose.—3 to 15 grains (0·2 to 1 Gm.).

Greenish yellow or brown powder darkening on exposure to light and air. Yields 60-63% Bismuth Oxide on ignition. A definite compound of Creosote and Bismuth. It is completely soluble in Chloroform. When treated with weak Hydrochloric Acid at body temperature, it is decomposed and Creosote is liberated. In ointment form in eczema and as prophylactic against dysentery. The two component parts—the Creosote and the Bismuth acting together are thought to have distinct advantage.

BOUGIES.

Urethral Bougies. These are *firstly*, of gelatin basis in *two* lengths, namely, 2½ inches and 4 inches, and are directed to be dipped in warm water prior to insertion. For various contents, *see* Index.

(U.S. requires 7 Cm $=2\frac{3}{4}$ inches, weighing about 2 Gm., and 14 Cm. $=5\frac{1}{2}$ inches, weighing about 4 Gm. respectively.) *Secondly*, of Cacao Butter of *any* length up to 6 inches if desired, and of six sizes, with the following diameters :—No. 1, $\frac{1}{8}$ inch ; No. 2, $\frac{5}{32}$ inch ; No. 3, $\frac{3}{16}$ inch ; No. 4, $\frac{7}{32}$ inch ; No. 5, $\frac{1}{4}$ inch : No. 6, $\frac{5}{16}$ inch. These are for the treatment of gonorrhœa in its various stages. Those of Cotarnine (*q.v.*) are used to check bleeding.

The **U.S. Urethral Bougies** made with Oil of Theobroma are 7 Cm. and 14 Cm. long and weigh about 1 and 2 Gm. respectively.

Nasal Bougies are termed **Buginaria**. These are of elastic gelatin basis $3\frac{5}{16}$ inches in length and are medicated with **Boric Acid, Carbolic Acid, Copper Sulphate and Zinc Sulphate.** For strengths, *see* Index.

Nasal Bougie Mass.—Gelatin 15, Water 13, Glycerin 18 (weight).

BROMUM.

Br=79·92.

A dark brown liquid, Sp. Gr. 2·99, with penetrating odour. Soluble 1 in 30 of water. Is not used as such medicinally. Since the war Bromine has been made in large quantities in France from sea water.

Antidote to the fumes of—

Alcohol inhalation is good, *see also* chlorine and Irritant Gases under Antidotes.

Bromine Sterules for urea estimation, **1, 2·2 and 4 Cc.** and *Liquor Bromi, vide Vol. II.*

Magnesii Bromidum $MgBr_2+6H_2O=292·256$.

Contains 54·9% of Bromine, given in *doses* of 10 to 20 grains (**0·6 to 1·2 Gm.**) for hysteria and epilepsy as a nervine sedative. Soluble 1 in 0.6 of water and 1 in 2 of alcohol 90%.

Manganesii Bromidum $MnBr_2+4H_2O=286·834$.

Contains 55·7% of Bromine, and is given in *doses* of 1 to 3 grains (**0·06 to 0·2 Gm.**) as a nervine tonic. It is soluble 1 in less than 1 of water and alcohol. Both of these may contain less water of crystallisation.

Calcii Bromidum. U.S. $CaBr_2=199·91$.

Dose.—10 to 20 grains (**0·6 to 1·2 Gm.**).

A white crystalline powder soluble 1 in 0·3 of water and about 1 in 0·6 of alcohol 90%. Has been given in epilepsy with good results.

Flavoring.—Syl or Glyl Menthæ Piperitæ, Syl Limonis (bold dose), Syrupus Aromaticus.

Frequency and intensity of fits is diminished by Calcium Bromide —effective in half the dose of Potassium Bromide. Mental activity increases and general health improves. Effect marked if patient previously on Potassium Bromide.—A. Humphrey Davy.—B.M.J. ii./15,692. A. G. Auld points out the relative content of Bromine in the two salts. The effect is nevertheless, in his opinion, due to the calcium.— *ibid*, p. 765 ; see also *ibid*, p. 876 ; 909.

Bromal Hydras. $CBr_3.COH.H_2O=298.794$.

Dose.—2 to 5 grains (**0·12 to 0·3 Gm.**) at bedtime.

In large colourless crystals, which melt on the hand, soluble in

water 1 in $2\frac{1}{2}$. Applied externally it irritates the skin. It has been tried in epilepsy, chorea and insomnia.

***Bromalin** (T.M. 230304).—*Syn.* BROMETHYLFORMINE, HEXAMETHYLENTETRAMINBROMETHYLATE, HEXAMINE ETHYL BROMIDE. $(CH_2)_6N_4C_2H_5Br=249.128$.

Dose.—5 to 30 grains (**0·3 to 2 Gm.**) in cachet or mixture.

In crystalline powder or scales, soluble 1 in 0.6 of water, and about 1 in 25 of alcohol 90%. A sedative in neurasthenia and epilepsy.

Brominoleum, Brominol (33%).—*Martindale.*

Dose.—10 to 60 grains (**0·6 to 4·0 Gm.**) approximately equivalent in content of Bromine to 5 to 30 grains Potassium Bromide.

An additive compound of Bromine and Sesame Oil, containing $33\frac{1}{3}$% of the halogen in form of a thick brown odourless oil, Sp. Gr. 1·31. Gradually liberates bromine to the system.

Uses.—In epilepsy and all forms of nerve troubles, also in headache and sea-sickness. May also be rubbed into the skin if diluted with an equal weight of Lanolin Ointment.

It may be taken internally shaken up with an equal volume of syrup, in beer, wine or milk, or dispensed as follows : Brominol 33% 2 ounces, Gum Acacia 1 ounce, Chloroform 18 drops, rub together and add quickly with vigorous agitation Water *q.s.* to 6 ounces. *Dose.*—2 drachms equal 20 grains Potassium Bromide.

A weaker **Brominol** containing 10% of Bromine is also prepared. Sp. Gr. 1.008. A dose of $\frac{1}{4}$ ounce of this equals approximately 20 grains of Potassium Bromide.

Capsules contain 2 Gm. of 33% Brominol in each equivalent to (**1 Gm.**) 15 grains Potassium Bromide.

℗ **Mistura Brominol cum Nuce Vomica.** Brominol 30 grains, Gum Acacia 30 grains, Tincture of Nux Vomica 6 minims, Spirit of Chloroform 15 minims, Water to $\frac{1}{2}$ an ounce. For one average dose.

The urine from patients under Brominol treatment contains small quantities of Bromine in combination, and the fæces contain traces.—W. H. M.

Brominol Tablets are prepared, each equivalent to 9 grains of Potassium Bromide.

Brom-Albumen. *Syn.* BROMO-PROTEIN.

Dose.—10 grains (**0·6 Gm.**)=$\frac{3}{4}$ grain Bromine approx.—increased as desired.

A preparation containing 7% Bromine in organic combination with albumen, made by interaction of Bromine with Egg Albumen, in form of a light brown powder. Used as a substitute for Alkaline Bromides in epilepsy, where considerably larger doses than the above may be required. It is hardly soluble in 0·2% Hydrochloric Acid, even in presence of pepsin, but is readily dissolved in 0·5% Sodium Bicarbonate in the presence of Pancreatin, hence it is assumed that digestion and absorption takes place in the intestines.

***Sedobrol** (T.M. 347485) **Tablets** weigh 2 Gm., and contain 1·1 to 1·2 Gm. of Sodium Bromide and 0·1 Gm. Sodium Chloride, in addition to vegetable extractives and fat. Suggested for a salt-free Bromide Treatment or diet—the tablet being simply covered with 100 to 200 Cc. of hot water to produce a bouillon for use in nervous affections, epilepsy and migraine.

Dose.—1 to 3 tablets *pro die.*

Bromoform, U.S., P. Helv., Fr. Cx., Ph. Ital. $CHBr_3$=252·773.

Dose.—½ to 2 minims (**0·03 to 0·12 Cc.**) or more. P.G.V. and Fr. Cx. maximum single dose 0·5 Gm.; max. during 24 hours 1½ Gm. (=8 minims approx.). Children as many drops as years old—up to 6.

A limpid, colourless, sweet liquid, with an agreeable odour; Sp. Gr. 2·829 to 2·833, B.pt. 148° C. Soluble in alcohol 90% in all proportions, slightly in water, decomposed by light. It should be preserved by addition of 0·5 to 1% alcohol. Is a powerful sedative, useful in insane cases. **Capsules** contain ½ minim (**0·03 Cc.**) dissolved in oil.

Aqua Bromoformi. Well shaken, 1 minim is dissolved in 2 ounces of water. *Dose.*—1 to 4 ounces (**30 to 120 Cc.**).

For sea-sickness half doses occasionally.

Emulsio Bromoformi. *Dose.*—2 to 4 drachms (**8 to 15 Cc.**).

Bromoform ½ (fluid) drachm, tincture of senega ½ ounce, shake well and gradually add water *q.s.* to 5½ ounces, syrup of orange ½ ounce. Makes a good emulsion but not agreeable in taste. *cf.* Syrupus Bromoformi—*infra.*

Soluté Officinal de Bromoforme, Fr. Cx.

Maximum single dose 8 minims; *maximum during* 24 hours 4 drachms approximately.

Bromoform 1, Glycerin 3, Alcohol 90% 6, all by weight

Syrupus Bromoformi.—*Martindale.* *Dose.*—¼ to 1 ounce (**8 to 30 Cc.**)=½ to 2 minims of Bromoform.

Bromoform 2 minims, Alcohol 90%, 80 minims, Syrup 160 minims Glycerin ½ ounce.

This, we found after a number of trials, to be the only practical formula for a preparation of moderate alcohol strength, suitable for children—but even this is pungent by reason of the bromoform and may be diluted at time of taking. The Soluté of the French Codex cannot be taken without diluting and the Emulsio is not agreeable.

Uses.—In whooping cough diminishes number, duration, and severity of attacks, and mucous secretion is more easily got rid of

Poisonous effects from Bromoform.—L. ii./98,1816; i./99,119; **B.**M J. i./01,1202

℞ ✱**Rami** (T.M. 245697) **Syrup.** *Dose.*—Adult, 1 tablespoonfu 3 to 5 times a day; Children over 5, 1 teaspoonful 3 to 5 times daily. Children under 5, 15 minims diluted, every hour or ½ hour according to age. *Contains* "*per* (*tablespoon*) *dose*," Alcoolature d'Aconit 3 drops, Codeine 0·01 Gm., Bromoform 2 drops, Tolu 0·05 Gm.

Brometone. Tri-brom-tertiary Butyl Alcohol.

$C_4H_7OBr_3$=310·836. *Dose.*—5 grains (**0·3 Gm.**), repeated 2 or 3 times during 24 hours.

White crystals melting at 167° C. containing about 77% bromine. ***Soluble*** in alcohol, slightly in cold water.

Uses.—Hypnotic, analgesic, antiseptic. Useful in sea-sickness.

Capsules of Brometone, 5 grains in each.

In epilepsy, in some cases, of value and has some hypnotic power.

Large doses may produce dizziness, loss of appetite, and mental heaviness.—H.

For a résumé on Organic Bromine Compounds with comparison of the quantity of Bromine in daily doses *vide Vol II.*

BUCHU. (*Off.*)

The dried leaves of *Barosma betulina* (*Rutaceæ*) contain volatile oil and mucilage. Carminative and diuretic. Buchu has antiseptic action in irritability of bladder and for gonorrhœa. The **infusion** (1 in 20 boiling water) is representative of the activity of the drug. *Dose.*—1 to 2 ounces.

Flavoring.—Syl Aurantii Floris, Syl Lavandulæ; Syrupus Aromaticus.

Tincture (*Off.*) 1 in alcohol 60% 5. *Dose.*—½ to 1 drachm.

Fluidextractum Buchu, U.S.

Average dose.—30 minims. 1=1 hydro-alcoholic percolate.

Buchu Cultivation and differentiation from other members of the *N.O. Rutaceæ* in South Africa. The dried leaves of *B. betulina* should yield 1·45% of oil.—P.J. ii./21,308.

BUTYL-CHLORAL HYDRAS. (*Off.*).

Syn. Croton-Chloral Hydrate (formerly so-called), Trichlor butylidene Glycol. $CH_3.CHCl.CCl_2,CH(OH)_2$=193·456.

Dose.—5 to 20 grains (**0·3 to 1·2 Gm.**), in pills or cachets.

Antidotes.—Stomach tube, emetic, coffee, caffeine, atropine.

This body is produced by the addition of water to liquid Butyl Chloral which is the final product of the action of Chlorine on Aldehyde. In pearly-white crystalline scales with pungent odour resembling that of Chloral Hydrate, and an acrid, nauseous taste. ***Soluble*** 1 in 43 of cold water; freely in alcohol, 1 in 1 of glycerin, and olive oil 1 in 20.

Incompatible with alcohol. Butyl-ChloralAlcoholate will be formed, and in case of some mixtures will be precipitated.

Menthol 2, with Butyl Chloral Hydrate 1 part, liquefy. Combines also with Phenazone, *q.v.*

Flavoring.—Syl Menthæ Piperitæ; Extractum Glycyrrhizæ Liquidum, Syrupus Zingiberis.

Uses.—In combination with phenazone, cannabis, or gelsemium, Butyl-Chloral is useful in migraine; neuralgia of nerves other than the cranial are rarely benefited.

Mistura Butyl-Chloral.

Butyl-Chloral Hydrate 4 grains, Glycerin 15 minims, Water to 1 ounce.

Pilula Butyl-Chloral. 3 grains (**0·2 Gm.**) or more.

Dose.—1 every 2 hours, or hourly.

℗ **Pilula Butyl-Chloral cum Gelseminina.**—Neuralgic Pills.

Gelseminine Hydrochloride $\frac{1}{200}$ grain (**0·0003 Gm.**) is added to each of the above. ℗ **Tablets** are also prepared.

For facial neuralgia two at the outset followed by one hourly until six have been taken.

℗ Pilula Butyl-Chloral cum Camphora et Gelsemio.

Butyl Chloral Hydrate 2 grains, Camphor 1 grain, Alcoholic Extract of Gelsemium ¼ grain, Powdered Acacia Gum ¼ grain, Powdered Tragacanth ¼ grain, Powdered Liquorice Root 1 grain, Syrup *q.s.* Varnish. Use similar to the last mentioned.

Chloretone. *Syn.* **Chlorbutol; Trichlor-Tertiary-Butyl-Alcohol** $CCl_3.(CH_3)_2C.OH = 177\ 456$.

Dose.—5 to 24 grains (**0·3 to 1·5 Gm.**) in cachet, capsule, or tablet followed by a draught of water or milk, or suspended in a mixture.

Manufacture. This compound was discovered by Willgerodt in 1886, see Ber. 19 (1886), 2455. It is prepared by adding Potash to a mixture of Chloroform and Acetone.

White crystals, with camphoraceous taste, melting at 80° C. It volatilises with heat. ***Soluble*** 1 in 200 of water-solutions should be made as required), 1 in 10 of glycerin, 3 in 2 of alcohol 90%, 1 in 50 of Liquid Paraffin, 1 in 12 of Olive Oil.

Uses.—Local anæsthetic and antiseptic and slightly hypnotic. Acts particularly on the stomach. *Solutions* in liquid paraffin 1 to 2% have been used for inflammation of the middle ear.

Vaginal pruritus has been treated with a warm douche 0·4%.

For piles, 5 grains in a 30 grain suppository; for a dusting powder for wounds and scalds use Chloretone 23, with Zinc Oxide 120, and French Chalk 90 parts. 10% may be added to Linimentum Calcis for burns.

Chloretone Inhalant.—Contains Chloretone 1%, Camphor, Menthol and Oil of Cinnamon in Liquid Paraffin for use in rhinitis, bronchitis, nasal catarrh and 'sore throats.'

Capsules, 5 grains, check sea-sickness and other vomiting and are useful in chorea.

Post-operative vomiting and shock prevented. Value proved by 15 grains in a cachet where time permitted, to every adult operated on 1½ hours beforehand. Spinal Injection of Cocaine in Chloretone Saturated Solution has to our knowledge (Bickle, Adelaide) been conducted without vomiting occurring.

Tetanus successfully treated by Chloretone in dose varying between 30 and 120 grains per rectum in Olive Oil, and Antitetanic Serum. The Chloretone injections reduced rigidity of the jaw.—B.M.J. ii./10,1402.

Chloretone overdosage. Effects after use as sea-sickness remedy included incoordination, fulness in the head, lack of spirits. Should be given either in solution or limited to 10 grains daily with intermissions when extended over several days. Satisfactory when given in Oil or Paraffin or in Cachet when taken with moderation.—L. i./13,1375.

Semi-coma in a woman who took 30 grains for toothache has been observed. Undoubtedly a useful drug in the treatment of many conditions, but its action requires careful and constant supervision. The explanation of toxic effect is, that there is accumulation of the insoluble drug in the alimentary canal followed by sudden absorption of large quantities when any substance capable of absorbing it is taken by the mouth.—L. i./13,1557.

Chloretone Gauze, Sterilised, moist, is prepared in one square yard and 5 square yards in glass jars.

CAFFEINA.

Caffeine (*Off.*). **P. G. V., Ph Ned.** Fr. Cx., P. Jap., P. Ital. *Syn.* Theine, Guaranine. $C_8H_{10}N_4O_2,H_2O=212{\cdot}168$.

Dose.—1 to 5 grains (**0·06 to 0·3 Gm.**) or more—as much as 18 grains being recommended—given in solution, or in pills.

A crystalline alkaloid (M. pt. about 235 to 237° C.), usually obtained from the dried leaves of *Camellia Thea*, or dried coffee-seeds—*Coffea arabica*; also contained in Guarana (*q.v.*) and in Maté—the leaves of *Ilex paraguayensis*—also kola nuts—the seeds of *Cola acuminata*, growing in Western Africa; it is identical with Theine and Guaranine. Caffeine and Theobromine (*q.v.*) can be prepared from Xanthine $\left\{\begin{matrix}NH.CH:C.NH\\CO.NH.C:N\end{matrix}\right\}CO$ (Theobromine being di- and Caffeine tri-methyl-xanthine). These are Purin derivatives (*q.v. Vol. II.*). Chemically Caffeine and Theobromine are also **Ureides**, but cannot be deemed poisonous, *cf.* **Ureides**). ***Soluble,*** 1 in 80 of water, about 1 in 40 in alcohol, less in ether; acids render it more soluble in water, but it is a feeble base, and on concentrating the solution of the salts they are apt to split up, and the caffeine crystallises out by itself. Is rendered soluble in less water by the addition of an equal quantity of Phenazone. See also Caffeine-Sodio-Salicylate, *etc.*

Regarding the caffeine in coffee and tea taken as a beverage see Vol. II.

Antidotes.—Stomach-pump and emetics. Nitroglycerin also apomorphine $\frac{1}{12}$ grain are of value. Poisoning by 60 grains of citrate caused burning in throat, giddiness, violent vomiting, purging and diuresis, tremors of extremities, pain in stomach and bowels, and great thirst.

Uses.—In heart affections (*e.g.*, cardiac failure in pneumonia but its power as a cardiac stimulant is doubted), nervous headache, dropsy (of value in renal dropsy), stomachic (lessens metabolism). It wards off fatigue. Also given in diarrhœa. Subcutaneously in rheumatic affections with Sodium Salicylate *q.v.* Locally, to the eye, it dilates the pupil.

Bronchial asthma of adults is relieved by 2 to 5 grain doses of the Citrate before bedtime and again during the night is useful.—Yeo.

Neuralgic Powders. Caffeine 1 grain, Quinine Hydrochloride 5 grains, Phenazone 10 grains (or Phenacetin 5 grains).

Chlorosis.—Haldane and Lorrain Smith showed that in chlorosis, though the percentage of hæmoglobin in the blood is so much diminished, the total amount of hæmoglobin in the body is fully up to the normal Anæmia is only relative; it is due to excess of plasma, not to deficiency of hæmoglobin—*ergo* diminish the fluid of the blood and prevent reaccumulation. Caffeine in conjunction with Digitalis should be used. Magnesium Sulphate is useful for the bowels, and Zinc Sulphate has been tried by emesis. Intake of liquids must be imited, and as little salt must be taken as possible.—B.M.J. ii./09,1668.

For Estimation of Caffeine in presence of Acetanilide see Vol. II.

Elixir Caffeinæ—*Martindale.*

Dose.—1 to 2 drachms (=1 to 2 grains of Caffeine). Caffeine 17·5, Diluted Hydrobromic Acid 4, Simple Elixir (B.P.C. 1894) to 1,000.

Ⓟ **Elixir Antineuralgicum.**

Dose.—1 to 2 drachms (**4 to 8 Cc.**).

Phenazone 50, Caffeine 30, Cocaine Hydrochloride 1, Cochineal Tincture 6, Elixir of Orange 25, Alcohol (75%) to 1,100. Has been used on the Continent for headache.—Ph. Notes.

This preparation is slightly weaker than that in the last edition.

Caffeinæ Citras. $C_8H_{10}N_4O_2.C_3H_4(OH)(COOH)_3=376{\cdot}246$.

CAFFEINA CITRATA (*Off.*), U.S. (No formula.)

Dose.—2 to 10 grains (**0·12 to 0·6 Gm.**).

Treat caffeine 1 and citric acid 1 in a small quantity of distilled water, and evaporate to dryness on a water bath.

Soluble—1 in 32 water, 1 in 25 alcohol (90%).

The alkaloid is loosely combined with the acid, which latter may be volumetrically determined with standard Alkali, using Phenolphthalein as indicator.—Ph.

Incompatible with Potassium Iodide and Spiritus Ætheris Nitrosi, Iodine being liberated. But the following according to our experiments does not darken :—Potassium Iodide 5 grains, Caffeine base 2½ grains, Spiritus Ætheris Nitrosi (neutralised with Ammonium Carbonate) 30 minims, Water to 1 ounce.

Also incompatible with Sodium Salicylate. A little Sal Volatile or Sodium Hydroxide will prevent the Salicylic Acid being thrown out —or use half the Citrate as Caffeine Base.

Flavoring—Glyl or Syl Vanillæ, Glyl Sassafras, Glyl or Syl Lavandulæ; Syrupus Aurantii Floris.

Uses.—See Caffeine.

Caffeinæ Citras Effervescens. (*Off.*). Contains 4% of the Citrate, or about 2½ grains in a drachm, as in B.P. '98. U.S. EFFERVESCENT CITRATED CAFFEINE (not less than 1·9% anhydrous caffeine). *Dose.*—1 to 2 drachms.

'Vescettes' of Caffeine Citrate.

Each equivalent to 60 grains of the above, and containing about 2½ grains of caffeine citrate.

Effervescent Caffeine (*Base*), 3 grains in 1 drachm.

Dose.—1 to 2 drachms (**4 to 8 Gm.**).

This, though somewhat bitter, forms a palatable mode of giving a moderately large dose. For migraine the preparation is invaluable.

'Vescettes' of Caffeine (*Base*), contain 3 grains.

Effervescent Caffeine Citrate with Potassium Bromide, has in addition 5 grains of the latter salt to the drachm. For headache.

Tabellæ Caffeinæ Citratis contain 1 grain in chocolate basis, are agreeable to the taste. **Tablets,** contain 2 grains (**0·12 Gm.**).

Tablets of **Caffeine** 1 grain (**0·06 Gm.**), with **Phenazone** 3 grains also prepared with **Phenacetin** 4 grains. *Dose.*—1 to 5.

Caffeine Hydrobromide, $C_8H_{10}N_4O_2$, HBr, $2H_2O$ = 311·112.

Soluble 1 in 50 approx. **Hydrochloride** $C_8H_{10}N_4O_2$, HCl $2H_2O$=266·66 and **Hydriodide** (unstable).

Dose of each.—½ to 5 grains (**0·03 to 0·3 Gm.**) or more. In transparent crystals.

Tablets contain 2 grains each of the Hydrobromide.

Effervescent Caffeine Hydrobromide is prepared containing 4%, or about 2½ grains in a drachm.

Dose.—1 to 2 drachms (**4 to 8 Gm.**).

Caffeinæ Salicylas. $C_8H_{10}N_4O_2.C_6H_4OH.COOH=332{\cdot}235$.

Dose.—1 to 5 grains (**0·06 to 0·3 Gm.**).

White crystalline powder soluble in water.

Caffeine is very soluble in aqueous solutions of benzoate, cinnamate, and salicylate of sodium. These dissolve it in chemically equivalent quantities.

Caffeinæ Sodio-Salicylas.

Dose.—1 to 4 grains (**0·06 to 0·25 Gm.**) hypodermically, or *per os.* Max. single dose *per os*, 1 Gm. or in 24 hours, 3 Gm.

Evaporate to dryness Caffeine 50, Sodium Salicylate 60, Water 200.

A white amorphous powder, containing 43·8% of caffeine, and soluble 1 in 2 of water.

This salt and the corresponding cinnamate and benzoate act like digitalis, but more rapidly.

Caffeinæ Sodio-Benzoas. P. Jap. IV.

Dose.—As for the Sodio-Salicylate. Contains approx. 40% Caffeine.

Soluble 1 in 2 of water, 1 in 40 of Alcohol 90%.

For conjoint use of Caffeine and Novocain see **Sterules of Novocain and Caffeine.**

Intravenously, in 2 grain doses, stated to be the best and most reliable temporary stimulant for desperately ill patients. Its chief effect is to improve breathing, circulation and other fundamental functions, and, following its use, the mind and depressed vital reflexes become active and normal. Useful in cases of coma, shock, collapse under anæsthesia, and poisoning from morphine and other depressant drugs.—W. W. Duke, J.A.M.A., April 7th, 1923,998; see also P.J. i./23,403.

Sterules, Intravenous, of Caffeine Sodio-Benzoate.

2 grains (**0·12 Gm.**) in 75 minims (**5 Cc.**) are prepared.

Injectio Caffeinæ Hypodermica. N. E. H.

Caffeine 20 grains, Sodium Salicylate 17½ grains, Distilled Water to 1 drachm. *Dose.*—1 to 6 minims, contains 1 grain in 3 minims.

According to N.E.H., *Dose.*—1 minim for a child a year old. Unirritating—recommended for alcoholic and morphine intoxication, also for hemicrania.

Recommended in rheumatism.—M.A. 1906,428.

The addition of camphor as preservative for this injection is suggested. Thus to 3 Cc. of pure sterile glycerin add a solution of caffeine and sodium salicylate of each 0·25 Gm. in water 1 Cc.; then add spirit of camphor (10%) 1 Gm. or 1·25 Cc.; 5 Cc. contain caffeine 0·25 Gm. and camphor 0·1 Gm.

Hypodermic Tablets contain Caffeine Sodio-Salicylate ½ grain (**0·03 Gm.**). **Sterules** Hypodermic 1 grain (**0·06 Gm.**) and 2 grains (**0·12 Gm.**)

Iritis of rheumatic origin has been treated by injection into the median cephalic vein of Caffeine 0·05 Gm. with Sodium Salicylate 0·5 Gm.

Caffeinæ Tri-iodidum, **Caffeine Di-iodo-hydriodide.**

(*Sometimes called Caffeine Periodide—but it is not a 'true' periodide as we view it.*)

$C_8H_{10}N_4O_2HI$, $I_2+1\frac{1}{2}\ H_2O=602{\cdot}942$.

Dose.—2 to 4 grains (**0·12 to 0·25 Gm.**).

In prismatic black iridescent crystals, rich in iodine.

Has been used with success in rheumatism and gout.

Assay.—The two loosely combined Iodine atoms can be estimated by titration with standard thiosulphate solution and should equal about 43%. The total iodine is 63% approx.

ℙ1 **Pilula Caffeinæ Tri-Iodidi Composita** (*Billimoria*).

Dose.—One early in the morning, one about 3 or 4 p.m., and one at bedtime with water, to be lessened to two or one a day as required.

Caffeine Tri-iodide 2 grains, Arsamin ¼ to 1/3 grain, Valerianic Acid 2 minims, Green Extract of Belladonna 1/6 to 1/3 grain, Jalap Extract, *q.s.* (if constipated), Reduced Iron 1 grain (in asthma only). For one pill or Gelatin Capsule.

Asthma has been well treated with this compound by R. B. Billimoria (Bombay). The majority of the cases in India have not the usual book type "attacks," but dyspnœa every night for days and days, while during the day the patient may be fairly comfortable or again the dyspnœa may be slight or worse.

Whooping Cough even in infants, with proportionately smaller doses has likewise been well treated by this preparation.

Eupnine. *Dose.*—1 drachm before meals up to 4 drachms daily. Contains caffeine and iodine. In asthma, emphysema, and arterio-sclerosis.

Caffeinæ Valerianas. $C_8H_{10}N_4O_2.C_5H_{10}O_2=296{\cdot}257$.

Dose.—½ to 3 grains (**0·03 to 0·2 Gm.**). In irregular crystals or powder, of somewhat variable constitution. It controls hysterical symptoms, and is useful in pertussis.

Caffeine-Chloral.

Small white granular crystals, freely soluble in water, with the taste of chloral. Is analgesic and laxative, and in hypodermic injections of 3 to 8 grains useful in constipation, painful gastric distension, sciatica, and rheumatism.

Iodo-Caffeine.—*Syn.* SODIUM-CAFFEINE IODIDE.

Dose.—2 to 10 grains (**0·12 to 0·6 Gm.**)

A white powder, slightly soluble in cold, freely in water at 100° F. Contains 65% of caffeine. Is a good diuretic, especially to prolong the diastole in cases of enfeebled heart. Is useful in cardiac dropsy, and pleurisy with effusion. Said not to disorder digestion.

Antipyrin Coffeino-citricum.—*Syn.* ✻MIGRAININE (T.M. 73257), **P. Austr., P. Jap. IV.** and **P. Helv.**

Dose.—8 to 15 grains (**0·5 to 1 Gm.**). Slipule No. 00 holds 8 grains.

Contains 9% of Caffeine, 1% Citric Acid, and 90% of Phenazone; is of crystalline appearance, easily soluble in water.

Incompatibles as Phenazone *q.v.* Is serviceable in headache, but apt to cause sleeplessness.

Migralgin.—*Martindale.* *Dose.*—8 to 15 grains (**0·5 to 1 Gm.**)

Phenazone 88, Caffeine 9, Salicylic Acid 3: the ingredients are

fused together. **Tablets** 8 and 15 grains each. Slipule No. 00 holds 8 grains.

Has been used with success by sufferers from headache.

Oxyquinotheine Cachets—Dr. Faivre's.

According to analysis by C. Mannich and L. Schewedes in a German Journal these are said each to contain Caffeine 0·3 Gm., Pyramidon 0·15 Gm., Quinine Sulphate 0·135 Gm., Magnesia 0·04 Gm.—Copied from P.J. i./13,891. For which we take no legal responsibility.

Kola.

Dose.—10 to 20 grains (**0·6 to 1·2 Gm.**). Seeds of *Cola vera* contain about 2½% Caffeine, also in *C. acuminata* (not so much) (*Sterculiaceæ*).

Fr. Cx. Supp. 1920 allows seeds of other varieties of Cola providing they contain at least 1·25% caffeine.

Extractum Kolæ Liquidum. B.P.C. *Dose.*—10 to 20 minims. Kola nuts in 40 powder exhausted with 60% alcohol; 1=1.

Fr. Cx. standardises to 1·25% Caffeine, but the method of manufacture is stated to be impracticable.

The administration of Kola, Coca and Arsenic flavoured with a little Elixir of Orange forms a useful tonic and pick-me-up.

Flavoring.—Syl Lavandulæ, Syl Sassafras; Syrupus Aurantii, Elixir Simplex (not very good).

Tinctura Kolæ.

Dose.—20 to 60 minims (**1·2 to 4 Cc.**).

Kola nuts in powder 1, macerate one week in 60% alcohol *q.s.* to 6.

Vinum Kolæ.

Kola in coarse powder 1, in Sherry 25, macerate for 7 days, filter and flavour with Essence of Vanilla.

Celerina is said to contain Kola, Coca, Celery, and Viburnum.

℗ **Syrupus Kolæ Compositus.**

Dose.—1 to 2 drachms (**4 to 8 Cc.**) twice daily.

Iron, Quinine and Strychnine Citrate 3, Citric Acid 0·3, Sodium Glycerophosphate 5, Liquid Extract of Kola 50, Alcohol 90% 25, Syrup of Orange to 100. Finished product to be slightly acid. In anorexia, and as a general 'tonic.'—Ph. Notes.

Maté, *Ilex paraguayensis* (*Ilicaceæ*) *Syn.* Yerba, Paraguay tea, or Jesuit tea, contains less caffeine than tea, and is less astringent. Removes fatigue and induces sleep.

About the '*herva matte*' drinking, there is a complete system of etiquette. Narcotic in influence, it has none of the after effects of tea. It is tonic, laxative, febrifuge, and stimulant to the digestive organs.—P.J. ii./22,387.

For further notes on Maté—Analytical, Dietetic and Commercial, see Vol. II.

CALCIUM.

Ca=40·07.

Calcii Carbonas. $CaCO_3$=100·075. *Syn.* Craie Preparée, Gefälltes Calcium Carbonat.

Dose.—Per os 15 to 60 grains (**1 to 4 Gm.**).

White insoluble powder. Much employed in diarrhœa and dysentery and as an ingredient in tooth Powders.

Sys Specific. An Indian cure for sprue, dysentery, and diarrhœa. It consists of 'powders' containing principally Calcium Carbonate—one to be mixed with 12 ounces of water and laudanum to be added, if necessary.

Checks fermentation and effect is undoubted.—Sir J. Cantlie, Jl. Trop. Med., Aug. 1/23,255.

Mistura Cretæ, Chalk Mixture (*Off.*).

Dose.—½ to 1 ounce (**15 to 30 Cc.**).

Contains 3% with Sugar 6% and a little Tragacanth, in Cinnamon Water. The powders are generally kept mixed in a dry condition, and added to the cinnamon water as required.

Blair's Tooth Powder. Dissolve 3 of soap in about 4 of water and mix intimately with about 25 of precipitated chalk and dry at moderate heat. Dissolve Catechu 1 in Alcohol 5 and mix intimately with precipitated chalk 25. Mix equal parts of Oil of Wintergreen and Oil of Sassafras with a further 25 of precipitated chalk, using 6 drops of mixed oils for each 100 Gm. of powder. Mix the three portions and sift.—P.J. i./22,263.

Calcii Chloridum. (*Off.*). $CaCl_2 = 110{\cdot}99$. (P. Jap. IV. 6 H_2O.)

Dose.—Per os 5 to 15 grains (**0·3 to 1 Gm.**) in aqueous solution, or pills made with syrup; these must be kept in bottles.

Intramuscularly (deeply) 1 grain (**0·06 Gm.**) in 75 minims (**5 Cc.**). *Intravenously* 4 grains (**0·25 Gm.**) in 75 minims (**5 Cc.**) have been given. Hypodermically it may produce sloughing.

In fused white agglutinated, very deliquescent masses.

Soluble (the fused salt) in water 1 in 1½, in alcohol 90% 1 in 3.

Incompatible with carbonates, phosphates, sulphates and tartrates.

Flavoring.—Prescribe as Elixir *q.v.* or with Elixir Adjuvans or Elixir Saccharini.

Uses.—Calcium chloride increases the coagulability of the blood, and so acts as a hæmostatic (Sir A. E. Wright). Coagulability of the blood is—

Increased by—	Diminished by—
Carbonic Acid,	Oxygen,
Calcium Chloride or Lactate,	Alcohol,
Milk,	Restriction of Food,
Magnesium Carbonate or Lactate.—L. i./08,96.	Diminution of Lime Salts,
Phosphoric Acid and Soluble Phosphates,	Large quantities of Fluid,
Strontium Carbonate or Lactate,	Citric Acid,
Thymus Glands.—L. i./06,645,739. See also B.M.J., ii/10, 1594.	Rhubarb,
	Acid Fruit Juices,
	Acid Wines,
	Tobacco Smoking,
	Bile,
	Leech Extract, Hirudin (*q.v.*).

It is employed in itching skin affections, *e.g.* pruritus, prurigo, urticaria. It is useful in chilblains, full dose frequently, and certain forms of headache, *v. infra.* In tubercular disease, chorea, glandular affections, to stop the growth of uterine fibroids, and to check the vomiting due to sarcinæ.

To check profuse menstruation doses of 10 to 15 grains daily for a week before the period have been given; but not if there be kidney disease. Bleeding piles have been treated by injection every morning of 4 to 6 drachms of a 10% solution.

For inter-dental fissure 15% solution on pledget of wool.

Acute lobar pneumonia has been treated with 5 to 15 grain dose every 4 hours. Hæmophilia is well treated by this and the lactate.

To check intestinal hæmorrhages 30 to 60 grains daily have been given internally, accompanied by rectal injections containing 60 grains to two pints of water; opium may be given in addition.

Epistaxis has been treated by 10 grains, *t.d.*

Heart failure accompanying post-influenzal pneumonia, Sir Lauder Brunton pointed out, may be averted by extended use of Calcium Chloride. Usual dosage is 5 to 10 grains every four hours. Increases secretion and tones up the vessels. May be prescribed as **Elixir** *q.v.*

For methods of Estimating Calcium Salts in blood, urine and other fluids, see Vol. II.

Calcium has a sedative effect on the nervous system and diminishes permeability of the walls of the blood vessels.—B.M.J. ii./10,1594.

Coagulation of the blood is thought to be little affected by Calcium Chloride *per os*, but injected under the skin the time of coagulation was reduced in 15 minutes from 3½ minutes before injection to 1¾ minutes after.—Dixon, B.M.J. ii./09,540.

As ***hæmostatic.*** Calcium Chloride should be given ***intramuscularly.*** Hypodermically it may produce sloughing even in 1 grain doses.—W. R. Grove, B.M.J. i./20,47.

Hæmorrhage controlled by intramuscular injection of Calcium Chloride. 1 grain in 100 minims injected *deeply* into the gluteal muscles is generally painless. The Calcium value of the blood is found to rise slowly to a maximum in 6 hours and then to remain constant for 24 hours. The effect is probably a direct one on the blood vessels. The increased Calcium content of the plasma may cause combination between the Calcium and the blood lipoids with consequent acceleration of clotting. A second injection at end of 24 hours and a third, 24 hours later, may be given. *Per os, Calcium salts have no effect on blood Calcium.* Helpful in uterine hæmorrhages and results in aneurisms hopeful.—W. R. Grove and H. W. C. Vines, B.M.J. ii./21,40.

Calcium in the human economy.—W. R. Grove, Clin. Jl. Oct.31/23,521.

Intestinal tuberculosis (producing tuberculous diarrhœa) has been treated by Calcium Chloride ***intravenously,*** *e.g.*, 5 Cc. doses of 5% solution, with benefit. Ascribed to the action on the sympathetic system, checking peristalsis.—Pres. Nov. '19, p. 202.

Administration and Removal of Lime Salts.

Sir James Barr says that fixed *lime* (in the albumin molecule) increases viscosity and coagulability, while the *free* Calcium ions in association with the suprarenal and pituitary secretions increase the tone and contraction of the arteries and arterioles, heighten blood pressure and maintain force and efficiency of the cardiac contractions. Some persons absorb lime more quickly than others—a glass of milk may increase lime in the urine in an hour or two. The blood is the agent for carrying the lime to the tissues and from them to the excretory organs. Lime Salts have been found useful in treating exophthalmic goitre. The following are some special lines of treatment.

Angina Pectoris.—Phosphoric Acid ½ drachm (of the dilute acid) every four hours and all lime to be excluded from diet and the drinking water. On the other hand there may be deficiency of lime in which case Calcium Iodide and Iodine Tincture is beneficial.

Arteriosclerosis.—Chronic high tension leads to degenerative changes with subsequent atheroma and calcification of the deep layers of the intima of the aorta—lime salts are deposited as Calcium Soaps. Women are not so liable to arteriosclerosis as men—they get rid of a good deal of Calcium with each menstrual period.

Asthma.—There is an excess of free Calcium ions in the blood. Decalcifying agents to be given and lime-free diet. Milk, etc., rigidly excluded.

Bronchitis and *Emphysema.*—There is not, as a rule, too much free lime, but in the later stages too much fixed lime—rigid costal cartilages and fixed chest wall. Never let these become rigid—use decalcifying agents and lessen intake of lime.

Cirrhosis.—Lime index generally low, owing to the catarrh of the stomach and the intestines set up by the alcohol. First stop the alcohol.

Colitis.—In some cases of obstinate constipation there is too much lime in the blood and intestinal wall. In mucous colitis all forms of lime should be forbidden. Fats of the unsaturated type, *cf.* note under Oleum Morrhuæ, *e.g.*, a wineglassful of Olive Oil at bed time should be ordered.

Digestive Tract.—So-called "congenital" hypertrophic stenosis may be due to excess of lime in the milk. If people kept their bowels open, thus preventing *B. Coli* from assuming a malignant type, appendicitis would be rare. Some people absorb Calcium badly—this is due to the form in which it reaches the mucous membrane. The insoluble fats, Stearin and Palmitin, which constitute the greater part of beef and mutton fat, can be extracted from the fæces to the extent of 80% or more. The acids of these fats when split off readily combine with Calcium forming insoluble soaps which irritate the mucous membrane. Cod Liver and Olive Oil, butter and bacon fat contain a large amount of unsaturated fatty acids, which, *even* with lime, form relatively soluble soaps. When, therefore, a person is for any reason on a + lime diet the fat should consist largely of Olein. This accounts for beneficial action of Cod Liver Oil in rickets (*cf.*, B.M.J. i./11,500).

The popular view that milk is a suitable diet in adults in any form of illness is erroneous. In the production of intestinal stasis the lime salts play an important part. Insoluble Calcium Soaps have an injurious, irritating effect on the intestinal mucosa. On the other hand in atony of the stomach and intestines there is deficiency. Where lime is necessary it may be given internally as Iodide or Glycerophosphate or subcutaneously largely diluted with Normal Saline with addition of 5% Glucose.—B.M.J. ii./12,695; L. ii./537.

The commonest cause of gastric catarrh and of cirrhosis of the liver is alcohol; while the teetotaller from eating too much and from immoderate consumption of lime salts more frequently suffers from arteriosclerosis and chronic diseases of the kidneys.—B.M.J ii./12,162.

Disseminated Sclerosis.—Calcium Salts useful: the Sodium Salts injurious. Acids should be avoided.

Epilepsy.—All the soluble Calcium Salts do good. Calcium Iodide is the most efficient. Milk foods good. *See also* Calcium Lactate.

Locomotor Ataxia.—The Calcium Salts are in excess. Give Acid and Strychnine.

Migraine.—Lime Salts as a rule are in excess. Eliminate same from the diet and give Magnesium Sulphate in the mornings.

Muscular System.—In myalgia, or the so-called muscular rheumatism, there is Calcium deficiency. Correct also any dilatation or acid fermentation.

Nervous System.—For stability and tenacity a certain amount of lime is necessary, but avoid too much for quick thinking, speaking and acting.

Neurasthenia and Hysteria.—Lime Salts variable. As a rule they are deficient—give Calcium Glycerophosphate.

Pneumonia.—"In the acute stage of pneumonia the more scanty and the more sticky the expectoration, the more viscous the blood, the more Lime Salts and leucocytes it contains, *caeteris paribus* the more favorable the prognosis, and on the other hand the more fluid and hæmorrhagic the expectoration, the more liquid the blood, the less the Lime Salts and leucocytes the worse the prognosis."

Rheumatism, Acute.—There is an excess of free Calcium ions and a tendency to fibrin formation. Milk diet does harm—plenty of red meat which increases the Ammonia in the tissues and thus neutralises the sarcolactic acid, is beneficial. In gout there is more frequently an excess of lime in the tissues and urine than in the free state in the blood—decalcify, *e.g.*, with Phosphoric Acid.

Skin—Eczema, etc.—In many cases there may be deficiency of lime and a dilated stomach. In urticaria, eczema and serum rashes there is deficiency of lime in the blood.

Tetany and Cramp.—Usually there is dilatation, acid fermentation and deficiency of Calcium Salts.

Urinary Tract.—Healthy kidneys always excrete a certain proportion of Calcium, though not so much as the bowel. When diseased, Calcium may be retained. It is useful to precipitate the lime when examining urine as a routine. If there be no excess in the blood there will be none in the urine, but the condition of the kidneys and the Sp. Gr. of the urine must be taken into account. In dropsy Sodium Chloride should be excluded while lime salts are beneficial.

Wounds.—Heal best when there is a fair amount of Calcium in the blood—or it may be the other way. In all scar tissue there is a large amount of Calcium. In Dupuytren's contraction surgeons' operations have all failed. There is an excess of Calcium in these cases. —Sir James Barr.—B.M.J. ii./10,829.

In severe hæmatemesis of gastric ulcer the only reliable drug is Calcium Chloride, 1 drachm dissolved in 5 or 6 ounces of water given by the rectum, alone or in conjunction with saline transfusion or subcutaneous injections.—Whitla. Pract. Med.

In obstructive jaundice, to prevent hæmorrhage 30 grains thrice daily *per os*, and 30 to 50 grains simultaneously *per rectum*.—L. ii./09, 338.

In heart disease the benefit from milk diet may be due to content of lime salts.—(Brunton).

Spasmophilia (tetany of infants) is said to be aggravated by addition of Calcium to the milk. Cows' milk contains five times as much Calcium Chloride as human. Tetany is viewed as a form of Calcium poisoning.

In the **Nauheim baths** the increased specific gravity has a primary effect of raising the peripheral resistance of the body which is afterwards followed by reaction, and the effervescence stimulates, but the Calcium Chloride in the water has no effect—it is not absorbed—otherwise it might work great mischief.

Thrombosis or embolism, tendency to, should be stopped by decalcifying agents such as Phosphoric and Citric Acids and their soluble salts.—Sir James Barr.

Consumption and bronchitis are notably absent amongst workers in lime kilns and those who drink hard water.

Aneurism of the aorta (abdominal) apparently cured by Calcium Chloride in doses of 15—30 grains.—Whitla. Pract. Med.

The popular belief that hot lemonade 'cuts the phlegm' in bronchitis may be due to the fact that citric acid in lowering the coagulability of the blood would thus give it greater ease of gaining access to the infected focus.

Decalcified dietary in arterial atheroma.—The amount of 'lime necessary to man decreases with age. An adult should not take more than 1 Gm. a day—he eliminates about 0·9 Gm. *pro die*—elimination ought to be proportional to intake. Cows' milk, cheese, eggs, onions, contain 0·2%, being rich in lime. Moderately rich (0·1 to 0·2%) are peas, beans, cauliflower; poor in lime (less than 0·1%) are bread, meat, fish (most kinds), potatoes, apples, pears, plums, etc. Large amounts of milk, bread, beef tea, and green vegetables must not be taken by atheromatous subjects.

Angio-neurotic œdema treated with 10 grain doses thrice daily, increasing to 20 grains. The swellings which appeared continuously in different parts of the body disappeared completely.—L.ii./09,295.

An excess of Calcium Salts in the blood thought to be associated with the menstrual period.—P.R.S.M., Obst. Sect., *Vol. I.*, 291.

Clinically the effect in skin disorders though good is not, as Wright holds, due to increased coagulability of the blood. The soluble salts have no particular value. Mistura Cretæ as useful as Calcium Lactate.—Prof. R B Wild, B.M.J. ii./12, 696; L. ii./12,538.

A seasonal variation, especially in children, of Phosphorus and Calcium content of the blood—percentage being highest from March to July, the months of maximum sunshine, with a fall from August to February.—C. W. Saleeby, P.J. i./23,247.

W. Blair Bell believes in large doses of the Lactate—1 drachm. Given in large doses it acts as an aperient.—B.M.J. ii./12,698.

F. Ransom found that in glycosuria the greater the amount of sugar the larger the excretion of Calcium. It can be reduced by giving Sodium Bicarbonate.—B.M.J. ii./12,699.

Eclampsia treated by washing out the stomach and transfusion of a pint of Calcium Chloride Solution (30 grains to the pint) into a vein of the arm—also 20 grain doses four times daily *per os*. Rapid improvement. Possibly the Calcium Chloride acts as sedative to nerve cells.—B.M.J. ii./12,1124.

In nasal operations if excessive hæmorrhage occurs give Calcium Chloride or Lactate at once.—B.M.J. ii./13,737.

Vinegar and Orange Juice as possible causes of hæmorrhage in women. Several cases showed the association, supported by experiments with mixtures of Vinegar, Blood and Saline and controls without Vinegar.—with result that there was no coagulation in the bulk of the acidified in two months, and ample in the non-acidified in an hour. Calcium required.—B. Myers, L. ii./13,1665.

Hay fever. Consumption of large quantities of flesh increases the excretion of Calcium. A low body content of Calcium is favourable to hay fever, the administration of Calcium Chloride acting beneficially. A retention of Potassium and a greater output of Sodium results from increased Calcium in the diet.—J.C.S.A. i./1922,1210. 10 grain doses *t.d.* have been advised.

In *tuberculosis* the importance of Calcium has been dwelt upon by numerous writers. In various parts of the world workers *in lime and Plaster of Paris, found in general to be immune.* In the treatment of tuberculosis it is needed not only for healing properties but also to overcome hypo-alkalinity or acidosis, which is almost always present. Patients should have plenty of vegetables and fruits, milk and eggs, and if possible shells of fresh raw eggs ground to powder—boiled or stale will not do.—F. Tweddell, Med. Rec. per Medical World, April, 1922.

Pleuritic Effusion. Calcium Chloride *per os* found to have remarkable effect in treatment. 30 Gm. of the dry granulated salt (*Caution*: an extraordinary dose!) in 100 Cc. of water taken in a little coffee and milk the best method of administration.—per Pr. Sept. '23,233.

INFANTILE TETANY well treated by 30 grains *per os* every 4 hours; rapid cessation of convulsions. Cod Liver Oil as well and after.—S. Graham and G. H. Anderson, B.M.J. i./24,903.

Liquor Calcii Chloridi B.P. 1885, was 1 to 5 of distilled water. *Dose.*—15 to 45 minims (1 to 3 Cc).

Elixir Calcii Chloridi. *Dose.*—1 to 2 drachms, best given 1 hour after a meal.

Calcium Chloride 60 grains, Orange Syrup and Syrup of Tolu of each ½ ounce.

Gelatinum Calcii Chloridi. (*cf.* Gelatinum for further Gelatin Injections). *Dose.*—5 to 7 Cc. Warmed in a water bath and cooled to a suitable temperature. To arrest hæmorrhage injected into the gluteal region

This contains Calcium Chloride 5%, with Gelatin 5 to 10%. The addition of Gelatin stated to avoid the necrotic effect of the Salt.—Pr. May, '13,902.

Shock treated with an injection of Calcium Chloride 0·5 Gm., Glucose 1·5 Gm., Gelatin 0·3 Gm. in 10 Cc. Water. Ampoules kept ready, melt when required, give as such or dilute with tap water.—J. E. R. McDonagh, Pr., Aug., 1920.

In the siege of Kut-el-Mara Calcium Chloride was urgently needed by the Mesopotamia forces for treatment of scurvy. It was "home-made" by acting on lime with Hydrochloric Acid, of which latter there was abundance (used with Potassium Chlorate for chlorinating water). Nearly 2 lbs. of this home-made Calcium Chloride was issued daily for 2½ months.—Col. Hehir, Commission appointed to inquire into the Mesopotamia Campaign.—C.D. i./17,576.

Eczema treated with a 6% Calcium Chloride ointment: found to be effective.—G. Lampronti, per P.J. i./23, 573.

Viper bites well treated with 3% solution intravenously.—C. Kobayashi, per Jl. Trop. Med., May 1/22,121.

Calcii Iodidum. CaI_2=293·91. *Syn.* **Calcidin.**

Dose.—2 to 4 grains (**0·12 to 0·25 Gm.**). Given in *dilute* aqueous solution. Deliquescent crystalline powder. On exposure to light or air will give off Iodine; best preserved in amber bottles. Excellent results in foul ulcers and chilblains.

Eczematous patch on tibia measuring 7 × 3 inches cured by 4 grain doses thrice daily. Diabetic ulcer on foot also seat of recurrent mammary carcinoma were treated with it.

Varicose Ulcers.—Calcium Iodide in 10 grain doses *t.d.*, between meals and an Ointment containing Allantoin or Comfrey will probably heal these in a month. A few skin grafts prior to the Ointment to expedite.—B.M.J. ii./12,1740.

G. Arbour Stephens writes that contrary to Prof. Dixon's opinion that no useful drug had been introduced except by a man with a laboratory, he, without a laboratory, introduced the useful drugs—the Iodide and Permanganate of Calcium.—B.M.J. ii./12,1582. P.J. ii./12,555

Elixir Calcii Iodidi.—*Dose.*—1 drachm (**4 Cc.**). Calcium Iodide 3 grains, Aromatic Elixir 1 drachm. Has been employed in tuberculosis.

For further notes on Lime Salts see Calcium Lactate.

Calcii Peroxidum. *Syn.* Calcii Superoxydum. Gorit. CaO_2 = 72·07. It may be made + $8H_2O$.

Dose.—3 to 10 grains (**0·2 to 6 Gm.**) daily.

A white crystalline powder slightly soluble in water, evolving oxygen. It explodes if mixed with Glycerin or Formalin.

A useful intestinal antiseptic, given in milk, for infants, *e.g.*, in summer diarrhœa. Recommended in hyperacidity.

Under the name "**Calox**" is contained in a dentifrice.

Magnesium Peroxide 5 to 10% added to a prepared or precipitated chalk powder is even better as a dentifrice.—P.J. i./07,284.

Experiments on rabbits showed that Gorit has powers antagonistic to Hydrogen Cyanide. Germicidal power less than that of Hydrogen Peroxide.—U.S.D.

Soil-contaminated Wounds: Its use upon, was suggested.

Calcii Phosphas. (*Off.*). $Ca_3(PO_4)_2$ = 310·29. 'Neutral' or 'Tribasic' Calcium Phosphate, Calcium Ortho-Phosphate

Dose.—5 to 15 grains (**0·3 to 1·0 Gm.**).

White powder made by interaction of calcium chloride with sodium phosphate and excess of ammonia at a boiling temperature. Insoluble in water; soluble in dilute hydrochloric and nitric acids.

Uses.—To supply lime to growing bones and to assist in general nutrition. Is also given to pregnant women for the same purpose. Is an ingredient in Syrupus Ferri Phosphatis Compositus, *q.v.*

Magnesium infiltration as result of lime depletion in chorea to be overcome by excess of this element, *e.g.*, Calcium Phosphate 5 grains well mixed with Milk Sugar 5 gr., *t.d.*, should be tried.—J. Aulde, L. i./13,640.

Calcii Phosphas Mono-acidus. Fr. Cx. *Syn.* Dibasic Calcium Phosphate, Calcium Mono-hydrogen Phosphate.

$Ca_2H_2(PO_4)_2$, $4H_2O$ or $CaHPO_4$, $2H_2O$=172·15.

Dose.—10 to 30 grains (**0·6 to 2 Gm.**). Prepared by decomposing Calcium Chloride with Dibasic Sodium Phosphate.

Colourless crystals with slight acid reaction. Used in making Liquor Calcis Lactophosphatis, *q.v.*

***Pepsodent** (T.M. 396079, 418588). A dentifrice with an acid reaction due to Acid Calcium Phosphate.—L. ii./21,395.

Calcii Phosphas Di-acidus. Fr. Cx. *Syn.* Monobasic Calcium Phosphate, or Acid Calcium Phosphate.

$CaH_4(PO_4)_2$, $2H_2O = 270{\cdot}21$.

Dose.—5 to 20 grains (**0·3 to 1·2 Gm.**).

Deliquescent crystals, insoluble in alcohol.

Mix Calcium Mono-acid Phosphate 154 Gm. with Phosphoric Acid (50%) 200 Gm to a paste, and leave to stand 1 hour at about 50° C., add water sufficient to make clear and boil ¼ hour. Evaporate to Sp. Gr. 1·40 (taken on the warm liquor) and leave to crystallise.—Fr. Cx. We have employed this Salt for time past in making **Syrupus Tann-Iodo-phosphoratus** and **Vinum Tann-Iodo-phosphoratum**, *q.v.*

Calcii Saccharas.

Dose.—8 to 30 grains (**0·5 to 2 Gm.**).

In colourless tufts, soluble in water. An antacid for dypepsia, specially for children; also as an antidote to carbolic acid poisoning in 10 times above doses.

Calcium Monosaccharate is $C_{12}H_{22}O_{11}CaO = 398{\cdot}306$.

The **Di-Calcium Saccharate** has the composition $C_{12}H_{22}O_{11}2CaO = 454{\cdot}376$, and the **Tri-Calcium Saccharate** is $C_{12}H_{22}O_{13}CaO$, $3H_2O = 564{\cdot}494$. The compound of our own manufacture is the mono-saccharate.

Liquor Calcis Saccharatus. (*Off.*).

Dose.—15 to 60 minims (**1 to 4 Cc.**).

Prepared by interaction of slaked lime and sugar. Contains nearly 2% Calcium Oxide.

Calcii Hydras. $Ca(OH)_2 = 74{\cdot}086$. Should be recently made by action of water on calcium oxide. Has slight caustic action. Is more soluble in cold water than in hot. **Liquor Calcis** is given to infants with milk.

Warts (verruca plana) on the back of the hand are stated to have been cured in a week by ½ pint a day.

Linimentum Calcis (*Off*)

Solution of Lime 1, Olive Oil 1; or with Linseed Oil 1, is known as **Carron Oil**—Mid. H.

Eucalyptus Oil 1 to 2% is often added as antiseptic.

In the tropics Arachis and Sesame Oil are permitted.

Calcii Sulphas. $CaSO_4,2H_2O = 172{\cdot}162$.

Dose.—20 to 30 grains daily (**1·2 to 0·2 Gm.**).

A heavy white powder soluble in water 1 in 390.

For phosphaturia is considered a specific; it may be well given with an equal weight of Heavy Magnesium Carbonate.

Dried Calcium Sulphate, $2CaSO_4,H_2O = 290{\cdot}276$, so long as

it remains dry, is used to make Plaster of Paris splints. Two pounds require about one pint of water; this sets rapidly and firmly. U.S. have a powder about 95% $CaSO_4$ and 5% water.

Moistening with 5% Dextrin Solution makes a strong dressing but sets slowly. Sodium Chloride 1% added hastens setting but 2% retards.

Plaster of Paris Bandages, 2, 2½ and 3 inches wide (6 yards). In sealed tins. **Crinoline Bandages** are used for these and for silicating (*cf.* Sodii Silicas).

Calx Sulphurata (*Off.*) U.S. *Syn.* CALCII SULPHIDUM CRUDUM; CANTON'S PHOSPHORUS. Contains not much less than 50% CaS=72·13 (at least 55% U.S.).

Dose.—¼ to 1 grain (**0·016 to 0·06 Gm.**) in pill.

Some forms of it shine in the dark and are used in luminous paint. See P.J. ii./15,806; (CaS.) i./16,105, also Radium Luminous Paints.

Is prepared by reducing Calcium Sulphate by charcoal. A greyish powder with sulphuretted odour sparingly soluble in water with decomposition. It thus represents the properties of Harrogate, Barèges, Gilsland, and similar springs. Largely used for boils, carbuncles, acne, scrofulous sores, especially in glands of the neck. It rarely purges even in 2 grain doses thrice daily. Some give small doses *every hour.*

In bronchitis and phthisis where sputum is tenacious and ropy, cough hard and prolonged—Calcium Sulphide liquefies sputum and makes cough easier. In abscess of the middle ear, urinary tract, acne and wherever there is pus formation Calcium Sulphide should be given. In follicular tonsillitis ½ grain may be given every hour until alleviation, then every two hours, said to act as specific. In zymotic diseases, Calcium Sulphide probably finds its most useful place. In the treatment of contagious diseases of childhood Calcium Sulphide seems to act similarly to Antitoxin,—that is, it increases the inherent power of the blood to destroy bacteria and their poisons. Should be given throughout the course of measles, scarlet fever, diphtheria and whooping-cough.—Clin. Med. Jan. 1911.

Reading that Calcium Sulphide is specific for follicular tonsillitis, and having had this trouble for nine years, with only temporary disappearance of the lesions from medical treatment, a patient tried Calx Sulphurata, 1 grain pills, 3 per day. Supply of pills ran out in twenty days, but during this time tonsils had healed perfectly and there was no sign of relapse 60 days after last taking the pills. Extent of treatment not thought sufficient. Control of the disease also by Lactic Acid 25% solution as swab.—S. M. Klages.

Pilula Calcis Sulphuratæ, $\frac{1}{12}$, $\frac{1}{10}$, $\frac{1}{8}$, $\frac{1}{6}$, ¼, ⅓, ½, and 1 grain.

Tablets contain ¼, ½, and 1 grain. Keep in bottles.

In strumous ophthalmia, as well as in periostitis and alveolar abscesses has been found of service. For boils give 1 grain *t.d.*, increased to 8 grains *p.d.*

Stearettes of Calcium Sulphide, freshly made, should prove useful in suppurative conditions in fairly large doses, *e.g.*, 1 grain in each. They would avoid decomposition in the stomach.

Lotio Calcii Sulphurati, U.C.H. 1904.

Slaked Lime 4, Sublimed Sulphur 4, Distilled Water 35. Boil together, evaporate, and filter, to produce 20 of solution. Diluted with an equal quantity of warm water is a remedy for itch, which it will

cure in half an hour. It resembles in composition **Vleminckx' Solution.** (**Calcium Sulfuratum Solutum.**—P. Helv.).

For eczematous itching, baths of the Solution, 1 tablespoonful to every 7 gallons of water, have been used.

In scabies found too irritating for use. Not equal to a weak Sulphur Ointment in curative effect.—B.M.J. ii./17,468. Freshly precipitated Sulphur has been used by washing the patient first with a dilute Sodium Hyposulphite Solution and then with dilute Hydrochloric Acid. Subsequently to allay irritation, Sulphur Ointment.

Sulphurated Lime Depilatory.

Milk of lime charged with sulphuretted hydrogen.

Syrupus Sulphatum (H. P. Symonds).

Dose.—½ an ounce (15 Cc.) contains appropriate doses of the sulphates of Beberine, Quinine, Iron, Potassium and Sodium. Is useful for boils, &c. Taken twice or thrice daily

Pilula Sulphatum.

The salts of half-an-ounce of this syrup in two pills.

CAMPHORA.

$C_{10}H_{16}O = 152{\cdot}178.$

Dose.—2 to 5 grains (**0·12 to 0·3 Gm**).

Camphor is a white crystalline substance obtained from *Cinnamomum camphora* (*Lauraceæ*) in Formosa and Japan. It is sold in bells, and in ¼, ⅓, ½, 1 and 4 ounce cubes, also as **Flowers of Camphor.** The latter is a convenient form for dissolving.*

For Artificial Camphor, see Vol. II.

Melting Point 175° C., Boiling Point 204° C.—P. Jap.

Soluble in water, 1 in 700, in alcohol 90% 1 in 1¼ (more soluble in absolute alcohol), in ether 12 in 7 barely, chloroform 4 in 1 scarcely, volatile and fixed oils (olive 1 in 3), in glacial acetic acid 2 in 1.

It is rendered more soluble in water by the presence of carbonic acid, acid carbonate and carbonate of magnesium, sugar, and myrrh, and less soluble by bromide of potassium, liquor potassæ, sulphate of magnesium, alkaline carbonates and many other salts.

Camphor, when mixed in certain proportions with many crystalline substances, causes mutual liquefaction of the two—*e.g.*, camphor 4, phenol 12, and water 1 (*see* Acidum Carbolicum); camphor 1, and chloral hydrate 1 (*see* Chloral Hydras); camphor 2 and menthol 3 (*see* Menthol), camphor 1 and thymol 1 (*see* Thymol); camphor 2 and β-naphthol 1 (*see* Naphthol); camphor 2 and salol 3 (*see* Salol); camphor and butyl-chloral hydrate liquefy when heated, but solidify on cooling; so will camphor 84 and salicylic acid 65 (*see* Camphora Salicylata). Camphor is powdered by rubbing with a few drops of alcohol.

Flavoring.—Extractum Glycyrrhizæ Liquidum.

Uses.—Sedative, anti-spasmodic, carminative, expectorant, diaphoretic, anaphrodisiac, antiseptic, given internally to abort colds in

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*Essential Oil of Camphor is of a pale straw-colour or darker, with fragrant odour, Sp. Gr. 0·898 to 0·920; consists principally of a terpene, with about 1 in 4 or less of camphor in solution, the heavy variety is preferred for rubbing in rheumatism. The heavy Oils range from 0·975 to 1·025, 50 to 75% Safrole. Light fractions practically devoid of same.—P.J. ii./o8,62.

the head, to relieve hiccough, for whooping cough, diarrhœa, chordee and lumbago. Is injected as a stimulant for patients *in extremis.*

For arteriosclerosis and for old patients with heart trouble continued use of camphor internally is of value.—L. i./18,143.

Meningitis caused by camphor liniment has been treated by caffeine injection. Cases of Camphor habit have been reported.

Caution.—It is dangerous to place camphor or menthol, *e.g.*, a 20% ointment into the nostrils of an infant. A small quantity of this camphor ointment applied in this way for coma in an infant of 9 months caused immediate collapse with signs of a severe syncopal attack.—Pres., July, 1913.

Besides the official preparations, **Camphor Water,** (Camphor Julep or Mixture) 1 in 1,000, Liniment* 1 to 4 Olive Oil (U.S. orders same strength in camphor to be prepared with Cotton Seed Oil—Oleum Gossypii Seminis expressed from *Gossypium herbaceum* and other species—*Malvaceæ*), **Ammoniated Liniment** (—*Poisonous, not to be taken*) 12½%, with Lavender Oil 0·5%, and Strong Solution of Ammonia 25%, Alcohol 90% *q.s.*, **Spirit** 10% (and U.S., *Syn.* **Teinture de Camphre Concentrée, Alcool Camphré** Fr. Cx.), and **Compound Tincture** 0·3%, the following are in use :—

Aqua Sedativa. **Eau Sedative.** Lotion Ammoniacale Camphrée (Fr. Cx.).

Spirit of Camphor (10%) 10, Sodium Chloride 60, Solution of Ammonia 60, Distilled Water 1,000, all by weight. As a compress for migraine and rheumatism, and to contusions.

(*Note.*—**Teinture de Camphre Faible,** Fr. Cx. is 1 in 40 Alcohol 60%.).

Camphor Ball.

Spermaceti 4, White Wax 12, Oil of Almonds 5 ; melt in a water bath and add Flowers of Camphor 4. Dissolve, and when nearly cold pour into moulds. Useful for chapped skin.

Camphorated Chalk.

Flowers of Camphor 1, Precipitated Calcium Carbonate 7 Mix, and sift for use as a dentifrice.

Camphorated Carbolic Acid, *vide* **Acidum Carbolicum.**

Elixir Camphoræ. *Dose.*—½ to 1 drachm (**2 to 4 Cc.**).

Spirit of Camphor 10, Syrup 5, Distilled Water 1. Contains 1 in 16. It mixes and diffuses well in water.

Æther Camphoratus, P. Helv. Camphor 1, Æther 9. Dissolve. **P. Dan.** has 15% in Spiritus Ætheris.

Oleum Camphoratum, Huile Camphrée Fr. Cx. 1 to 9 of Olive Oil.

Injectio Camphoræ Hypodermica. *Dose.*—10 to 30 minim. (**0·6 to 2 Cc.**).

Camphor 1, Sterile Olive Oil to 5.

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* In preparing this, '*English-refined*' flowers should be rubbed through a sieve, and dropped into the oil at 70° to 80° F. Foreign flowers give muddy solution. **Oleum Camphoræ Forte, P.G.V.** is the same strength.

Examination of camphorated oil for camphor substitutes.—P.J. i./09,3.

In pneumonia 25 minims has been given as a general rule to start with, but much larger doses have been employed—even 12 Cc. of a 20% solution.

Injectio Camphoræ Hypodermica (Aetherea) L.H.

Camphor 2 grains, Ether 3 minims, Olive Oil to 10 minims.

Sterules, Hypodermic contain Camphor 1½ and 3 grains in Sterile Olive Oil; **Sterules of Camphor** ½ grain, **with Ether** 15 minims; also **Sterules** of Camphor 3 grains with Guaiacol 2 grains, employed in phthisis.

Curschmann's Solution.

Dose—15 minims (1 Cc.) increased if necessary.

Camphor 2, Ether 3, Olive Oil 7.

Sterules of Curschmann's Solution 1 Cc.=0·2 Gm. (3 grains) of Camphor are prepared.

Cardio-vascular diseases treated by Camphor. During the course of chronic myocarditis with simple cardiac insufficiency, changes in rhythm and auricular fibrillation, no drug can compete with Camphor in sustaining activity of the heart and steadying the pulse. *Dose*, 0·1 Gm. (1½ grains) in oil hypodermically once or twice daily—or *per os*. Not merely a remedy in the hour of death, but used intelligently can be given with benefit throughout the entire course of various cardiac and vascular diseases.—Prof. Marfori —Policlinic, per L. ii./17,466.

For use in heart failure in typhoid and pneumonia it is one of the most valuable excitants we possess.—U.S.D.

Gassing by Chlorine, etc. It has been injected for the cardiac weakness.

Injections of Camphor and Ether are practised for patients *in extremis* Gastric hæmorrhage is stated to have been arrested by the injection. Not suited when there is insufficient active carbohydrate metabolism.

In purulent peritonitis 100 Cc. of 1% Sterilised Solution of Camphor in Olive Oil, poured into the peritoneal cavity after opening and removing the appendix and wiping away pus, and distributed over the whole area of the peritoneum. Also advised as prophylactic in all sections where the peritoneum is already affected.—B.M.J. ii./11,764.

Sciatica and neuritis well treated.—Jensen, B.M.J,E. i./20,17.

Caution.—Various amounts (30 to 300 Cc.) of 1 to 10% Sterile Camphorated Oil have been injected in this way. A case recorded of acute poisoning from 170 Cc. of 10% Solution after an operation of the uterus. 1% may be safe and not more than 300 Cc. of this solution.—L. ii./12,546.

℗ Pigmentum Camphoræ Chloral et Menthol.

Acute fibrositis. In early stage hot fomentation useful. Afterwards one of the best applications is Camphor, Chloral Hydrate, and Menthol, *p. aeq.* painted on and rubbed in gently with the fingers—or paint with Iodine Tincture, and apply hot poultices or very hot fomentation.—A. P Luff, B.M.J. i./13,858.

Pilula Camphoræ.

The most suitable excipient to form camphor into pills is about ⅓ its weight of powdered curd soap and a few drops of alcohol, or a little lard in a warm mortar.

Tablets, Camphor and Quinine. Camphor ¼ grain, with Quinine Acid Sulphate 1 grain. To check catarrh, and as a tonic.

Spiritus Camphoræ Fortior. *Syn.* RUBINI'S SOLUTION.

Flowers of Camphor 1, Absolute Alcohol (by weight) 1. *Dose* for diarrhœa.—2 to 5 drops on sugar every 5, 10, or 15 minutes, according to the severity of the symptoms.

Trochisci Camphoræ contain 2 grains in each.

Wool, Absorbent, Camphorated (33%).

Acidum Camphoricum, U.S., VIII. PH. NED., P. HELV., P. JAP. IV.

$C_8H_{14}(COOH)_2 = 200{\cdot}178$.

Dose.—10 to 20 grains (**0·6 to 1·2 Gm.**) in cachets.

Formed on oxidation of camphor with nitric acid (test for free nitric acid with ferrous sulphate) odourless crystals, M. Pt. 187° C.

Soluble in water about 1 in 200, in alcohol 90% about 1 in 1½, and in fatty oils about 1 in 10. It is dextrorotatory.

Synthesis of Camphoric Acid.—Na. Feb. 1911, 522.

Uses.—With success in night sweats of phthisis, also in cystitis by intravesical injections of 2% aqueous solution with 11% alcohol and as an intestinal disinfectant. Further in solution as a local astringent for nose and throat, also for diarrhœa. In skin affections saturated solution in dilute alcohol locally useful.

Camphora Monobromata, $C_{10}H_{15}BrO = 231{\cdot}09$.

P. Helv. directs—gradually combine Camphor 15, Bromine 16 in a mortar. Also official in **U.S.**, P. ITAL IV. and **P. Jap.**

Dose.—2 to 10 grains (**0·12 to 0·6 Gm.**) in pills, with ⅓ of its weight of curd soap and proof spirit *q.s.*

In colourless prisms, soluble in ether, alcohol, and fixed oils, insoluble in water. Should be soluble in sulphuric acid with nearly colourless solution. M. Pt. 76° C.—P. Jap. It is used as a hypnotic, and of value in epileptic vertigo, cases of petit mal, chorea, hysteria, delirium tremens, whooping-cough and asthma, and for erections in gonorrhœa.

Tablets contain 1 grain (**0·06 Gm.**). **Perles** 2 grains (**0·12 Gm.**)

Elixir Camphoræ Monobromatæ.

Monobromated Camphor 1, Spirit of Cinnamon (1 in 10) 10; dissolve and add Red Elixir 60, Syrup *q.s.* to 100. *Dose.*—½ an ounce (**15 Cc.**).

Enuresis is treated with this combined with belladonna, where potassium bromide is unsuitable.

Camphora Salicylata. *Dose.*—1 to 5 grains (**0·06 to 0·3 Gm.**), in pill, with suet or lard.

Camphor 56, Salicylic Acid 44, combined. Soluble about 1 in 20 in oils and alcohol. As ointment in skin affection.

Trochisci Camphoræ Salicylatæ Compositi. Camphor Salicylate 2 grains, Sodium Sulphate 4 grains. One thrice daily an hour before food. To ward off a cold.

CANNABIS INDICA (*Off.*), U.S.

The dried flowering or fruiting tops of the female plant of *Cannabis sativa* (*Urticaceæ*), grown in India (not deprived of resin). The masses obtained in European commerce are called Guaza. Ganja differs slightly and is more active. Bhang or Hashish consist of the leaves, small stalks and fruits.

The therapeutic value of the drug is contained in the resin. It appears to contain no peculiar alkaloid. The constituent Cannabinol becomes oxidised on exposure to the air. For use in medicine it should be as fresh as possible. It is a powerful drug.

A high export duty is imposed on it. *N.B.—The official dose of Extract has proved toxic.*

For details of Assay and Physiological Examination, see Vol. II.

Cannabinol.—The red oil obtained by Marshall in 1896 from Charas (*See Vol. II.*), is physiologically active but it is a crude substance containing various bodies. Again, it is not the only active substance. Description of effect of red oil on the author of the paper,—delightful dreams.—H. A. D. Jowett, P.J. i./13,403.

Antidotes.—Stomach pump, emetics, stimulant draughts, artificial respiration, coffee. No death from cannabis is on record.—H.

Tobacco dust was recently found to contain 0·66% of Cannabis Indica in peculiar circumstances.—For further details see *Nicotine.*

Effects of large doses of Cannabis Indica depicted by the author's experiment on himself. There is a distinct unmistakable sex tinge to its action, exhilaration and emotion.—A. Schneider, per P.J. i./23,389.

Flavoring.—*Vide* Tinctura.

Uses.—For chordee and asthma, also as an aphrodisiac, and is successful in migraine. Is a narcotic and anodyne, but may give peculiar dreams and even delirium.

It is useful in dysmenorrhœa, especially with Gelsemium ; with Nux Vomica in incipient delirium tremens, nausea, and paroxysmal colic, supraorbital neuralgia, cough of phthisis and for whooping-cough. It is of great use combined with strychnine, with chloral in chorea in mental worry and restlessness. Should be given in small and frequent doses. It is *the* remedy for menorrhagia.

In delivery, may in some cases hasten the contraction of the uterus, acting quickly without anæsthetic effect.—U.S.D.

In obscure forms of pruritus the Tincture is of value—suspended in mucilage and given after meals well diluted.—B.M.J. ii./09,452.

In gonorrhœa (urethritis acuta anterior) Cannabis internally with Hyoscyamus is useful before patient is in condition for injections.

Extractum Cannabis Indicæ (*Off.*). In U.S. is *assayed biologically.*

Dose.—$\frac{1}{4}$ to 1 grain (**0·016 to 0·06 Gm,**), in pill with lycopodium. An alcoholic extract, of which 1 dissolved in alcohol 90% *q.s*, to 20 forms—

Tinctura Cannabis Indicæ (*Off.*). **U.S.**, 1 in 10 of alcohol, assayed biologically. *Dose.*—5 to 15 minims (**0·3 to 1 Cc.**), in some mucilaginous fluid.

Flavoring.—Glyl Lavandulæ, Glyl Amygdalæ Amaræ, Glyl Pini, Syl Vanillæ; Syrupus Aurantii, Syrupus Zingiberis.

Tablets equal 5 minims.

Tetanus after child birth, two cases cured by 15 minims of Tincture every 3 or 4 hours.—L. i./06, 1608.

Fluidextractum Cannabis, U.S. 1 = 1. An alcoholic percolate assayed biologically. *Dose*—1½ minims (**0·1 Cc.**).

Pilula Extracti Cannabis Indicæ, contain ¼, ⅓, ½ and 1 grain.

In sciatica a pill of Cannabis Extract and Hyoscyamus Leaf in powder of each 1 grain is useful. *Dose.*—2 to 5 during the day. Local treatment, often of the first importance, should be combined with this.—Pr., Mar. 1911, 459.

ℙ CANTHARIS.

ℙ *Cantharides and its poisonous derivatives.*

Ⓟ *Cantharides, Tincture and all vesicating liquid preparations and admixtures of (and N.B. last clause of Part II. of Schedule).*

Syn. Lytta; Spanish or Blistering Fly.—P. Jap. IV. has *Epicauta Gorhami* with 1% Cantharidin.

Dose.—$\frac{1}{16}$ to ½ grain (**0·004 to 0·03 Gm.**) in pill. Better given as tincture. Fr. Cx. Max. single dose ¾ grain. Max. in 24 hours, 2 grains.

Antidotes.—Emetics, stomach pump, white of egg (no fats); sedatives.

Cantharidin poisoning. Crystals, probably 1/50th grain, taken by a medical student out of misplaced curiosity. Caused blood in urine and albumin.—Recovery.—C. H. Andrewes, L. ii./21,654. *See also* note under Liquor Epispasticus.

For note on Estimation of Galenicals, see Vol. II.

Uses.—Externally vesicant, irritant and powerful counter-irritant. Used in pleurisy, pericarditis, meningitis, neuritis, applied above the stomach to stop vomiting and in rheumatoid arthritis, (*v.* Emplastrum).

Internally is said to have aphrodisiac properties. Has been given in lupus and in chronic gout. Caution, avoid irritation of the kidneys. Hæmaturia is checked by five-minim doses of tincture. It is of service in incontinence.

In cardiac dropsy Cantharides is one of the most useful means of promoting diuresis. It acts on the secreting cells of the tubules, and the effects manifest themselves quickly. Dose of Tincture may be 2, 3 or 10 minims according to age, given several times daily. Can usefully be added to a mixture containing Caffeine, Tincture of Strophanthus and Spirit of Nitre.

ℙ **Mylabris phalerata** and *sp.* are not now official but were in I.C. Add. for making external applications in India. These contain about 1 to 2% of the neutral principle—

ℙ **Cantharidinum** (*Off.*), P. Ital. IV., P. Helv.

$C_8H_{12}O(CO)_2O = 196{\cdot}146$.

Or more than double the amount in Cantharides.

Cantharidin is the Lactone of Cantharidic Acid, in flat glistening rectangular prisms, which melt at 210° C. approx. (P. Ital. 218°), and volatilise in very irritating white fumes. ***Soluble*** 1 in 56 of chloroform, 1 in 38 of acetone, and about 1 in 150 of acetic ether.

Soluble also in ether, benzene, glacial acetic acid, 1 in 1,000 of absolute alcohol, and about 1 in 400 of water (Greenish).

Poisoning Effects and Antidotes see *Cantharis*.

Uses.—Solutions of Cantharidin, as well as other preparations of cantharides, are employed for stimulating the growth of the hair, in alopecia, and preventing its falling off.

Ⓟ **Acetum Cantharidini** (*Off.*) contains Cantharidin 1 in an Acetic Acid solution *q.s.* to 2,000. Replaces **Acetum Cantharidis** B.P. '98.

Ⓟ **Linimentum Crinale** (Squire).

Cantharidin 1 grain, Acetic Ether 6 drachms; dissolve with gentle heat, and add Alcohol 90% 6 ounces, Castor Oil 2 ounces, Lavender Oil 15 minims. It is better to dilute this with an equal quantity of spirit, and the head should be washed after applying it a few times, to prevent the cantharidin accumulating.

Ⓟ **Emplastrum Cantharidini** (*Off.*) contains Cantharidin 1, in a basis of Beeswax 225 and Wool Fat *q.s.* to 500 previously melted together. Replaces Ⓟ Emplastrum Cantharidis B.P. '98. The wax may be decreased or increased if necessary.

Ⓟ **Emplastrum Calefaciens** B P.'98.—Is $\frac{1}{10}$ strength of this.

Ⓟ **Emplâtre Mouches de Milan** used in France is similar to Emplastrum Cantharidis B.P. '98.

In rheumatoid arthritis counter-irritation valuable,—it must be prolonged and pronounced. Slight irritation is useless and it must be in the neighbourhood of the cervical and lumbar enlargements. Cantharides plasters 4 in. or 5 in. by 2½ in. painted over immediately before application with Cantharides Liniment or Liquor Epispasticus to ensure rapid action, are applied at bed time one on each side of the seventh cervical vertebra or the twelfth dorsal, according as the joints of the upper or lower extremities are most affected—leave on for 24 hours. If the patient's kidneys are unhealthy the electric cautery should be used instead of Cantharides After blistering and cutting away the loose cuticle a bread poultice made with Boric Lotion is applied over night. Next morning dress with fresh Savin ointment and repeat every eight or ten days—soak well with Boric Lotion in removing. Twenty drops of Laudanum at night useful. Pain and swelling of joints generally much relieved after three or four days. For further details of the method (general treatment of patient) refer to Latham P.R.S.M. Baln. Sectn., May, 1910, p. 110 or L. i./10,929.

The theory is that the changes in the joints and muscular wasting are due to active and destructive lesions in the spinal cord, and especially the cervical and lumbar enlargements. See also B.M.J i /13,864.

Ⓟ **Emplastrum Vesicans.**

Cantharidin 1, Chloroform *q.s.*; heat to dissolve and add to Yellow Wax, and Wool Fat, in equal portions, previously melted together,499.

Ⓟ **Liquor Epispasticus** (*Off.*) is now made about same strength as B.P. '98, using Cantharidin.

Effects of painting the side with the Liquor to the size of a surface measuring 7 by 2¾ inches—in error. Blood, albumin, kidney cells passed in the urine.—L. ii./08,800.

Ⓟ **Collodium Vesicans** (*Off.*) is approximately the same strength.

Ⓟ **Linimentum Cantharidis Compositum**, W.H., has Liquor Epispasticus 60, Glacial Acetic Acid 20, Rosemary Oil 3, Castor Oil 90, Alcohol 90% to 480.

Ⓟ **Emplastrum Cantharidis Liquidum**, a special preparation,

is painted on with a brush. It dries rapidly, forming a pellicle on the skin. Effect more certain than with a plaster.

The size of a blistering plaster is usually 1 inch square—rarely more than 2 inches square. For applying behind the ear the shape should resemble that of the space formed when the tip of the forefinger comfortably touches the tip of the thumb.—Marshall.

℗ **Oleum Cantharidatum. P. Jap. IV.**

Macerate Cantharides in powder 3, in Olive Oil 10 on the water bath for 10 hours with occasional shaking. Strain.

℗ **Tinctura Cantharidini** (*Off.*) 1 in 10,000; is approx. $\frac{1}{7}$ strength of F.I. U.S. 1 of Cantharides in 10 Alcohol (94·9% vol.). *Dose.*—2 to 5 minims (**0·12 to 0·3 Cc.**).

Fr. Cx. 1 of Cantharides in 10, Alcohol 70%. (F.I.) Max. single dose 9 minims and max. during 24 hours 25 minims approx.

Lupus treated by doses *per os* of 8 minims ($\frac{1}{2}$ Cc.) of a 1 per 5,000 solution of Cantharidin in Tincture of Orange well diluted with water and in conjunction with mercury have proved beneficial in syphilis.—B.M.J. ii./02,1231.

℗ **Unguentum Cantharidini** (*Off.*).

Contains Cantharidin 1, dissolved by means of Chloroform in Benzoated Lard. Strength 1 in 3,000. Is about $\frac{2}{3}$ strength of Unguentum Cantharidis, B.P.'98.

One part diluted further with two of soft paraffin forms a useful pomade for stimulating growth of the hair.

Erasmus Wilson's ℗ **Unguentum Stimulans** is described as consisting of 1 of Cantharides in 5 of plain lard.

℗ **Unguentum Cantharidin cum Hydragyro Compositum** is sold as 'Pomade Max.'

℗ **Unguentum Hydrargyri Oxidi Rubri et Cantharidis,** W. H. Blistering Liquid 15 minims, Red Mercuric Oxide Ointment 1 ounce.

℞ **Potassii Cantharidas.** Fr. Cx. ($+ 1H_2O$).

$C_8H_{12}O(COOK)_2,2H_2O = 326·378$.

Dose.—$\frac{1}{400}$ to $\frac{1}{200}$ grain (**0·00015 to 0·0003 Gm.**) hypodermically in very dilute solution. In minute white needles, soluble 1 in 25 of water. Has properties representative of Cantharidin, *q.v.*

A case of suppuration in the ear, perforation and discharge following influenza. At the time of treatment the suppuration had ceased and the ear was dry although a large perforation remained. Treated by a 'paint' of Liq. Epispasticus 1 in 10 in Compound Tincture of Lavender and then subsequently 1 in 8, 1 in 6, 1 in 4, and 1 in 2. The drum head was at first lightly touched daily with a cotton mop of the 1 in 10 dilution. After reaction to this irritant a stronger paint was used. The strongest is only required when granulation tissue has been formed on the membrane. Within a fortnight a whitish film formed on same which was removed. The drum head gradually thickened. At the end of the month perforation healed. The upper half only of the structure was treated as it has a more generous blood supply, and will, therefore, tolerate these measures with less risk of perforation than the lower half.—This proceeding affects the whole drum head. Result: sound ear and restored hearing.

A Solution of Potassium Cantharidate,—Cantharidin 1 grain, Potassium Hydroxide 1 grain, Water 300 minims, *i.e.*, equivalent to the Liq. Epispasticus,—applied similarly was successful in tightening loose drumheads This is diluted for use with Glycerin and Water equal parts.

Numerous cases of deafness from various causes treated and markedly improved.—C. J. Heath, 'The Nature and Causes of Catarrhal, "Throat" or **Hereditary Deafness.' May, 1912.**

CAOUTCHOUC. (B.P. '98.)

India-Rubber. *Syn.* ELASTICA.

The prepared milk-juice of *Hevea brasiliensis* (*Euphorbiaceæ*) and other species; known in commerce as Pure Para Rubber.

Preservation. —The best means of preserving rubber goods is to immerse completely in distilled water. Lime Water, Alkaline Solution, Glycerin Solution, and Boric Acid Solution were tried in addition, with the above expression of opinion.—C.D. i./14,73.

Liquor Caoutchouc (B.P. '98).

Caoutchouc 1, Benzol 10, Carbon Bisulphide 10.

In making this liquor it saves time to treat the rubber with the carbon bisulphide alone for an hour or two to form a jelly, then the benzol may be added and the preparation be ready in 24 hours. May be mixed with :—

Salicylic Acid 5%, Pyrogallic Acid 10%, Boric Acid 5 and 10%, Aluminium Acetate 1%, Ichthyol 5 and 10%, β Naphthol 5 and 10%, Capsicin 1%, Chrysarobin 10 and 20%, Bismuth Subgallate 5%,—whilst 'sticky' dust with a little Talc—thus used the 'patch' is hardly noticeable.

Bandages of rubber are (i.) webbed with strands of rubber; (ii.) Statham's porous; (iii.) Martin's (solid) perforated and non-perforated; (iv.) Elastic Circular Stocking and India-rubber Webbing.

Bladder Irrigators consist of glass douche can with 5 foot rubber tubing with stop-cock and two-way rubber catheter; some have two-way metal pipe.

Bladder Syringes are of 4 or 5 ounces capacity, with glass or brass barrel. Herring's is of rubber with bayonet catch nozzle.

Bougies of solid elastic gum :—

With bulbous end = à Boule, in sizes 1 to 16.
,, ,, silk web ,, ,, 1 to 16.
Conical pointed in shape ,, ,, 1 to 12.
Cylindrical, not tapered, various textures and materials—Sizes 1 to 16
Æsophageal Bougies are bulbous, conical and cylindrical, of elastic gum.—Sizes 10 to 24.

Catheters.—Elastic gum, black and webbed, or silk web—
Bulbous (à Boule), sizes 1 to 16.
Coudé (bent at end) also Bi-Coudé with two bends.—Sizes 5 to 12.
Cylindrical.—Sizes 1 to 15, with or without wire Stilettes, and sizes 5 to 12 with solid or hollow ends.
Conical (simply pointed, *i.e.*, tapered), with wire Stilette.—Sizes 1 to 12.

Catheters, Soft Rubber.—Those in demand are in lengths of 13 and 16 inches respectively. They are supplied with and without funnels, and the sizes vary between 4 and 12.

Belfast linen Catheters are also prepared.

Web Catheters may be sterilised by boiling in nearly saturated solutions of Ammonium Sulphate or Sodium Chloride, washing afterwards in sterile water.

Catheters, Female, are of glass, straight or curved (Queen Charlotte's Hospital), metal, or soft rubber.

Dental Rubber, manufactured of pure para rubber and coloured. This is supplied in various shades of colour, *e.g.*, white, pink, red, orange, black. The varieties in commerce are designated 'Samson,' 'Doherty,' 'Gold Dust,' Ash's 'Whalebone,' and Jamieson's 'Horn.' The rubber is hardened by vulcanisation, and used to form a frame to carry artificial teeth In vulcanising most rubber, especially Ash's, raise the temperature gradually until 315° F. or 100 lbs. pressure is obtained. Maintain this temperature or pressure 75 minutes to complete vulcanising process

Drainage Tubing is of various dimensions, and is supplied in Carbolised solution in glass tubes.

Elastic Hosiery comprises stockings, socks, knee caps, leggings, thigh pieces, knee hose, thigh hose, anklets, elbow pieces, cuffs, mitts. Measurements should be made from the limb first thing in the morning.

Eye Douches. Bowman's consists of rubber ball, with tubing and mount.
The Moorfield's Pattern consists of Douche can with tubing.
The "Undine" is a glass flask with pointed spout.

Finger Stalls and **Cots** are made in rubber for digital examination.

Gutta Percha Tissue in ¼ yard, ½ yard, 1 yard pieces, and as required is prepared from Gutta Percha, the dried milky juice of *Palaquium oblongifolium* and other varieties of *P.* (*N.O. Sapotaceæ*). Contains about 80% gutta similar to that of caoutchouc.

Gutta Percha Tissue for dressing wounds.—It may be sterilised by washing in Methylated Spirit. It is applied direct to the wound after cleansing and covered with wool and bandage. It is seen on the third day—if the wound remain clean it is inspected through the dressing (this is of great advantage) and inspected again on the fifth day,—the dressing remains undisturbed until the removal of the stitches on the eighth or tenth day, when a similar dressing is applied and kept in place till cicatrisation is sufficiently established for there to be no danger of infection.—B.M.J. ii./10,622.

Macintosh or **Waterproof Sheeting,** 44 inches wide (see also **Pegamoid**) is supplied:—
1. Double texture and double width. 2. Having rubber on both sides

Nasal Douches or **Irrigators** are—
1 Of rubber tubing, with stop-cock for use as a *syphon.*
2. In the form of a *spray bottle* for spraying into the nostrils.
3. *Boat shape*, of glass, with aperture for covering with the finger, and thereby controlling the flow of liquid. This latter form is useful where a small quantity of solution is employed, as in a simple catarrh.
Woakes' pattern has a rubber nozzle, and is similar.
5. *Syringe form*, consisting of rubber bulb or glass tube with piston, with shaped vulcanite or rubber nasal plugs.

Oiled Calico. Calico treated with boiled oil, and thus rendered waterproof.

Oiled Silk is supplied (*a*) green, (*b*) in the non-adhesive (French) form of yellow colour, and (*c*) a further variety is brown in colour.

Oiled Silk, Dextrinized, is prepared from the best English Oiled Silk by treating the latter with a solution of Carbolized Dextrin.

Oiled Silk Protective. This consists of oiled silk coated on both sides with copal varnish, and when dry, brushed over with Dextrin 1, Starch 2, Carbolic Lotion (1 in 20) 16.

Operation Gloves are made in thin, medium and heavy weights (rough and smooth).

Pessaries are ball shape, butterfly, circular, oval, cradle, and ring form.

Plasters, Spread:—
India Rubber, Adhesive, 7 inches wide, 1 yard and 5 yard rolls.
India Rubber Adhesive, Porous, 1 yard rolls
,, ,, (Mead's) Tapes, ½, ¾, 1, 1½, 2, 2½, and 3 inch, in both 5 and 10 yard lengths.

Stomach Tubes.—That known as Van Valsh's, with bevelled "Velvet Eyes," is considered one of the best but the bevelling may have the disadvantage of weakening the tube on one side and causing it to turn round when an obstruction is met. For passing the tube a special Lubricant Glycerin Jelly is supplied in Collapsubes, or a Glyco-Gelatin Pastil of Menthol $\frac{1}{1\frac{1}{2}}$, and Cocaine $\frac{1}{20}$, is useful. (*Vide* Examination of Stomach Contents.)

Sutures (*vide* Ligatures).

Syringes—
Vulcanite and glass with rubber nozzle, "Glycerin" Injection.
India-rubber ball with soft rubber nozzle in one piece (ear and nose)
Rubber ball with bent glass nozzle (ear and nose).
Ball with conical vucanite nozzle (Injection "Bottle").
Ear: Barrel shaped of glass or brass.
Enema, for rectal injection and vaginal douching.
Durham's back-flow syringe in ¾ oz. and 1½ oz. sizes.
All-rubber urethral syringes 1, 2, 3 and 4 oz. capacity.

Janet's wound syringes are useful for bladder irrigation, in glass and metal also in all metal, usual capacities are 2, 3 and 4 oz.

Urethral, rubber ball ½ ounce size, with bone pipe or elastic gum, short or long (Golding Bird's is a special form). See also Hypodermic Syringes.

Intra-laryngeal, with three apertures to ensure full distribution of fluid.

CAPSICI FRUCTUS (*Off.*). U.S.

Dose.—½ to 1 grain (**0·03 to 0·06 Gm.**), in a pill.

The dried ripe fruit of *Capsicum minimum, C. fastigiatum* (*Solanaceæ*), Cayenne pepper is from Nepaul.

Contains as chief constituent Capsaicin—formula variously stated.

Capsicin.

Dose.—$\frac{1}{20}$ to $\frac{1}{10}$ grain (**0·003 to 0·006 Gm.**).

Made by extraction with 90% Spirit. It is a dull reddish brown oily mass becoming crystalline.

Gerrard found that Alcohol 90% is a good menstruum for extraction. He prepares a 2 in 1 liquid extract, and from this an ointment 1 in 10 with the official basis or hydrous lanolin, also a plaster 10%.

Oleo-Resina Capsici, U.S.

A bright red oil obtained by exhausting with ether, distilling off the greater portion of it; allowing the remainder to evaporate spontaneously in a warm place. Pour off the liquid portion, transfer the residue to a glass funnel, with a plug of cotton wool, and, when the fatty matter (to be rejected) has been completely drained, mix the liquid portions.

1½ of acetone will exhaust (if percolated slowly) 1 of capsicum. Yield of oleo-resin 5 to 16%.—Caspari.

Umney held that Capsicin is not synonymous with the Oleo-Resin.

The word "***Oleoresin***" properly applies to the *ether or acetone extractive*. A weighted quantity is dissolved by solution of soda filtered through calico, the solution is then acidified and extracted by ether. The dried ether extract is then treated with 60 per cent. spirit. To prevent any oily acid from passing through the filter, stir with calcium sulphate or the like before filtering. The spirit solution is evaporated and the dried extract weighed. A sample of a preparation made with 60% Alcohol gave 10·66 per cent., while one of the true oleoresin gave 18·82 per cent.—D. B. Dott, P.J. i./22,64, C.D., 1922, 117.

Pilula Capsici Composita.

Capsicum Oleo-resin ½ minim, Clove Oil ½ minim, Calomel 1 grain, Aloes 2 grains. For the atonic stomach of drunkards.—H.

Ⓟ Emplastrum Capsici. (Ⓟ *cf.* Emp. Plumbi).

Evaporate the Alcohol from Liquid Extract of Capsicum 10, and stir into Resin Plaster 95. Contains 5% of Solid Extract (Gerrard). U S. has Oleo-Resin of Capsicum 0·25 Gm. brushed over 15 square Cm. of adhesive plaster.

Capsicum plasters in rubber combination are also made in sheets 7 in. by 5 in., and yard rolls 7 in. wide.

Emplastrum Capsici Mite (Mild for dental use) R.D.H.

Caoutchouc 10, Yellow Paraffin 1 Heat carefully so as to just liquefy and add Resin 10, Powdered Orris Root 4, Finely Powdered Capsicum 4. Mix and spread on linen and cut into pieces half the size of finger nail. Dry the gum thoroughly before application.

Emplastrum Capsici Forte, R.D.H.

Prepare as above, omitting the powdered Capsicum.

Spread and brush the surface thinly with Oleo-Resin of Capsicum *q.s.* (Neither of these plasters contains lead.)

Fluidextractum Capsici, U.S., VIII.

Dose.—1 minim (**0·06 Cc.**) Alcoholic Percolate 1=1. Gerrard favours the following formula :—

Exhaust Capsicum 100 in fine powder (No. 60) by percolating with 90% Alcohol, distil off alcohol until the residual extract weighs 50,1 of extract=2 of drug, *i.e.*, double the strength of the U.S. preparation.

Unguentum Oleo-Resinæ Capsici.

Oleo-resin of Capsicum 1, Hard Paraffin Wax 1, White Soft Paraffin 8. Melt the paraffins, add the oleo-resin, and stir until cold. For use as the liniment.—P.J. ii./11,630. May be too strong for tender skins—will bear dilution 2 or 3 times.

Gyrol Pencils.—A French specialty possessing the revulsive properties of Capsicum.

Tinctura Capsici (*Off.*). 1 in 20 of 60% alcohol. U.S. 1 in a mixture of Alcohol (94·9% vol.) 95 and Water 5, *q.s.* to 10.

Dose.—5 to 15 minims (**0·3 to 1 Cc.**).

Given internally it increases the flow of saliva and gastric juice. It also increases the peristalsis of the intestine, relieves atonic dyspepsia, and is useful in dipsomania—it allays the craving for alcohol. *cf.* Mistura Capsici Sedativa, *infra*. The official tincture is too weak for external use as a rubefacient.

Filariasis is treated prophylactically by Pepper and Capsicum. Tincture of Capsicum found useful in acute filarial fever and lymphangitis.—J. A. Robertson, L.ii/15, 673.

Tinctura Capsici Ætherea.

Prepared as official tincture, with pure ether *vice* alcohol,—L i./90 1066.

Tinctura Capsici Fortior, B.P.C.

Dose.—1 to 3 minims (**0.06 to 0.2 Cc.**). Principally used externally. *Is practically identical with Concentrated Tincture of Capsicum* (Turnbull).

Capsicum in No. 80 powder 1, Alcohol (90%) *q.s.* to 3. Is useful for chilblains but only when the skin is not broken.

This is too irritating generally. The writer's formula is :—

Linimentum Capsici.—*Martindale.*

Capsicum Fruit in No. 80 powder 10, percolate with Alcohol (90%) to 70, and add Oleic Acid 10, Oil of Lavender ½. Painted on the skin, or applied sprinkled on piline or flannel, in an hour it produces a red glow ; its action may be arrested by smearing the part with vaseline. Useful in chest affections, rheumatism, sciatica, &c. Does not redden the skin for any length of time, hence may be used on exposed parts.

Linimentum Capsici Duplex is the latter, double strength.

Mistura Capsici Sedativa (anti-alcoholic).—L.H.

Dose.—½ ounce (**15 Cc.**) containing Capsicum Tincture 5 minims, Tincture of Ginger 20 minims, Potassium Bromide and Sodium Bicarbonate each 10 grains. Decoction of Cinchona to ½ ounce.

Unguentum Capsici (*Off.*) is about same strength as **B.P. '98,** but basis is altered.

Resembles Smedley's Chillie Paste.

The following formula (Gerrard's) is not wasteful of the fats :—

Liquid extract of capsicum (1=2 of drug, Gerrard) 60 grains, olive oil 1 ounce, spermaceti 60 grains, melt the fats and stir in the liquid extract. A more absorbent ointment would be liquid extract of capsicum 60 grains. hydrous lanolin 1 ounce 60 grains.

Capsicum Wool, Calorific Wool.—Oleo-resin of Capsicum 1, Ether 30, Absorbent Cotton 19. Dissolve the oleo-resin in the ether, saturate the wool evenly with the solution and dry.

Alternative formula (Gerrard):—

Dissolve liquid extract of capsicum (Gerrard) 2 ounces in alcohol 90% 7 ounces. Pour the solution on to the cotton wool 9 ounces under pressure to saturate evenly. Dry and preserve in well closed cartons. Contains 10% extract. Colour with eosin, as otherwise the colour fades. Cover with oiled silk when applying to increase activity.

* **Capsogen** (T.M. 327250) is a trade variety of the above encased in gauze.

Capsicum Gamgee Tissue is also made.

All the above are very useful in rheumatic affections, bronchial and similar painful complaints where warmth relieves.

CASCARA SAGRADA (*Off.*) U.S., etc.

Syn.—Sacred Bark.

The dried bark of *Rhamnus purshiana* (*Rhamnaceæ*).

Dose.—3 to 15 grains (**0.2 to 1 Gm.**) in cachets.

In spite of much research the active constituents of Cascara representing the effects of the drug cannot be succinctly defined. In Vol. II. we provide much scientific information on this matter. *Off.* requires the bark to be kept one year before use.

Cascara Sagrada occurs extensively in British Columbia, the only British Colony in which it occurs wild.—P.J. i./23,314. For notes on cultivation, *see* Vol. II.

Flavoring.—See Extractum Cascara Liquidum.

Uses.—Cascara acts as a vegetable bitter, increases peristalsis, empties rectum, is useful for internal piles, and is a good laxative in habitual constipation. For dosage see Liquid Extract.

Patients subject to uric acid gravel may sometimes find Cascara Sagrada of service.—Tirard, Med. Treatment.

Cascara Capsules (**'mild'**) represent half a drachm of Liquid, or about 6 grains of Solid Extract. Capsules (**'strong'**) of **double this strength** are also prepared.

Dose.—1, 2, or more. The mild are also prepared with 1 grain **Euonymin** in each in addition. *Dose,* 1 or 2 at bedtime.

Cascara Jelly.

Dose.—1 to 4 drachms, equivalent to Cascara Extract ½ to 2 grains. Suitable for the treatment of habitual constipation.

The agar-agar basis renders the fæces more voluminous and richer in water. The Cascara Extract produces the stimulating action on the bowels. The preparation is agreeably flavoured, but if desired the jelly may be taken with a little jam.

Cascagar.—*Martindale.*

Dose.—1 teaspoonful up to 2 tablespoonsful to be taken with stewed apple or other moist food.

A preparation of flaked Agar with Cascara Extract flavored with Lemon It increases the volume of the fæces, at the same time giving the necessary moisture.

Syrupus Cascara Aromaticus (*Off.*). *Syn.* **Elixir of Cascara B.P C., 1894.**

Agreeably flavoured with Orange and Cinnamon.

Contains 40% of Liquid Extract of Cascara.

Dose.—½ to 2 drachms (**2 to 8 Cc.**). Very small doses three times a day are pleasantly laxative.

Extractum Cascara Sagrada Siccum (*Off.*).

Dose.—2 to 8 grains (**0·12 to 0·5 Gm.**) in pill.—An aqueous extract (*Cascara Sagrada* is indeclinable, being Spanish and not Latin).

U.S. IX. 1=3 of drug by extraction with boiling water, powdering and finally adjusting with starch and magnesium oxide. Fr. Cx. extracts with 60% alcohol.

Extractum Cascara Sagrada Liquidum (*Off.*).

Dose.—30 to 60 minims (**2 to 4 Cc.**).

An aqueous extract containing 25% of alcohol (90%) *i.e.*, the spirit strength is increased, this is an advantage. That of B.P. '98 we found to deposit on keeping, and to ferment in hot climates; we prefer alcohol (20%) as a menstruum. With this a more active preparation is formed. It may be made miscible with water by the addition of half its volume of sal volatile.

110 minims on evaporation on a water bath for 4 hours should yield not less than 20 grains of residue.

P. Belg. is similar. **P. Jap.** makes with Alcohol 90% and Water equal parts. **Fr. Cx.** with Alcohol 50% 1 = 1 by weight. **Fluidextract U.S.** 1 = 1 by percolation with hot water evaporating and adding 25% of alcohol (95% vol.).

The following formula has been suggested (*cf.* Glycetracts):—

Moisten Cascara 20 ounces with Water 15 ounces, and set aside 6 hours, pack loosely in percolator and percolate with more water to exhaustion. Evaporate percolate to 12 ounces, cool and add Glycerin 8 ounces, allow to stand, filter and add to the filtrate Strong Solution of Ammonia 80 minims. Without the Ammonia the preparation became turbid. The Glycerin re-dissolves some of the matter thrown out on heating, hence probably the supposed increased laxative action of a Glycerin Extract. The Glycerin Solution above mentioned filters easily. J. H. Franklin.

Acetic Acid extracts Cascara satisfactorily—Y.B. 1899.—P.J. ii./09,142.

Use in Constipation.—

It is best to take advantage of its tonic properties and avoid its purgative action. The initial dose depends on the individual, but it must be correctly found—15 to 20 drops *t.d.*, suffices for the adult The object is to procure one motion only a day. The dose that is sufficient must be taken in a wineglassful of water thrice daily after meals for a week or ten days, or until the action becomes somewhat too pronounced. Then reduce dose by one drop only and take with same regularity as before. In time it will be found that 1 drop in water thrice daily after meals will be sufficient Finally the medicine may be omitted altogether.

Constipation in a child will often be relieved by one to three drops in a drachm of syrup one to three times a day.—Gordon Sharp, Pr. Mar., 1913.

Flavoring.—Syl Lavandulæ, Syl Vanillæ, Extractum Glycyrrhizæ Liquidum, *v.* also Syrupus Cascara Aromaticus.

Orange, Coriander, Anise, Cassia and Liquorice all mask the unpleasant taste of Cascara.

Fluidextractum Cascaræ Sagradæ Aromaticum, U.S.—*Average dose.*—30 minims (2 Cc.) 1=1. Made by percolating the drug mixed with magnesia

Cascara Sagrada evacuans ℥ii

with boiling water, evaporating and adding several flavoring agents. Sometimes called "Aromatic Cascara" in the States. The magnesia is said to destroy the bitter taste.

Extractum Cascara Aromaticum Liquidum.—*Cowley.*

Dose.—30 to 60 minims (**2 to 4 Cc.**).

Cascara Sagrada (No. 20 powder), 20 ounces, Diluted Sulphuric Acid, 1 ounce, Alcohol (90%), 4 ounces, Oil of Coriander and Oil of Orange, of each 20 minims, Spirit of Chloroform, 80 minims, Gluside (soluble), 13 grains, Liquid Extract of Liquorice, 4 ounces, Solution of Ammonia and Distilled Water, *aa. q.s.*

Boil the cascara with 7½ pints of distilled water and the diluted sulphuric acid for two hours; allow the mixture to stand 24 hours, then pack in a percolator and exhaust with distilled water Neutralise the percolate with ammonia, and evaporate on a water bath to 12 ounces maintaining slight alkalinity throughout the operation by the further addition of ammonia from time to time. Dissolve the oils and gluside in the alcohol, and add the spirit of chloroform and the liquid extract of liquorice. Mix this with the concentrated percolate, and if necessary make up to 20 ounces with distilled water.

The activity of Cascara may be due to decomposition products of one or more glucosides, hence the use of acid. The product is elegant and active.—C.D. ii./11,115.

Unofficial solid Extract of Cascara has been made by boiling the bark with water—by this process a large amount of resinous matter reaches the final extract. The resinous matter is practically tasteless and probably has little therapeutic activity. It is possible that this method of Cowley splits up the resinous matter into active bodies.

✱**Kasak** (T.M. 90413).—*Dose* for children, 1 or 2 drachms; for adults, ½ ounce. A laxative free from the bitterness of Cascara Bark.

Kasena.—*Dose* as last, is the same with Senna. Kasena Capsules are also made.

Mistura Cascara. Gt. Orm. H.

Liquid Extract of Cascara, Liquid Extract of Liquorice, Syrup of Orange Peel, Chloroform Water, of each 15 minims for one dose.

Ⓟ **Haustus Cascara Sagrada Compositus,** Vic. Park.

Liquid Extract of Cascara 1 drachm, Hyoscyamus Tincture ½ drachm, Tincture of Nux Vomica 10 minims, Aromatic Spirit of Ammonia 1 drachm, Magnesium Sulphate 1 drachm, Syrup of Ginger 1 drachm, Water to 1 ounce.

Mistura Hepatica. *Dose.*—1 to 2 drachms in water. Liquid Extract of Cascara 20, Tincture of Jalap 20, Tincture of Podophyllum 10, Compound Tincture of Gentian 10, Chloroform Water 50, Sal Volatile 10.

Pastils of Cascara each contain 2½ grains of Extract, and are coated with Tolu. *Dose.*—1 or 2.

Ⓟ **Pilula Cascara Composita.**

Extract of Cascara 1½, Extract of Nux Vomica, Alcoholic Extract of Belladonna (B.P. '98), of each ⅛, Milk Sugar 1. In grains for one pill, or in grammes for fifteen, each pill weighing 3¼ grains.

Dose.—One before dinner or at bed-time.

Is an agreeable and efficient aperient, has certain and gentle action continuing beyond the first day; good for liver inaction. **Tablets,** plain or sugar coated, 1, 2, 3, 4, and 5 grains.

Dose.—1 or more according to strength.

Tinctura Cascara Sagrada.

Percolate 1 to 5 with Alcohol 60%.

Laxative dose.—10 to 60 minims (**0·6 to 4 Cc.**).

℗ Tinctura Laxativa.

Dose.—20 to 60 minims (**1·2 to 4 Cc.**).

Liquid Extract of Cascara Sagrada 2, Aromatic Spirit of Ammonia 2, Spirit of Chloroform 2, Tincture of Belladonna 1, Tincture of Nux Vomica 1. This is an agreeable and elegant form of administering cascara, being miscible with water.

Trochisci Cascara Sagrada et Olei Menthæ Piperitæ.

These are made with fruit basis, contain 2½ grains of Extract flavoured with Peppermint, and are useful correctives. *Dose.*—1 or 2.

Vinum Cascara.—*Martindale.*

Dose.—½ to 1 ounce (**15 to 30 Cc.**).

Liquid Extract of Cascara 1, Sugar 1, Aromatic Elixir 1, Sherry to 20. Mix and decant from any sediment which may form on standing.

Mucogene. $C_{18}H_{15}N_2O_2Cl$ = 326·686. *Dose.*—2 to 3 Capsules at bedtime. An anthraquinone derivative employed in capsule form, each containing 0·1 Gm., in habitual constipation. Said to be specific.

CATHA EDULIS.

Dose.—1 drachm to ½ ounce (**4 to 15 Gm.**) infused in about 6 to 8 ounces of hot water as required. A sprig of about 10 leaves weighing about 10 grains is chewed at a time by natives.

The leaves of this plant are known locally as Kat or Khat. It is a shrub about 12 feet high growing wild in Abyssinia and along the East Coast of Africa. It is cultivated for native use in Arabia. The leaves are serrated at the margin and vary from about 1 to 3½ inches in length. Their taste is slightly astringent, and at the same time sweet and strongly resembling licorice.

Three alkaloids have been isolated by R. Stockman—*Cathine* (very soluble in water), *Cathinine* (not very soluble in cold, but more so in hot), and *Cathidine* (insoluble).

Pharmacology.—In its action on the nervous and muscular system of the frog, the action of CATHINE resembles that of a combination of the actions of Morphine and Caffeine, while CATHININE has not the same drowsy or depressing action on the brain, but is more stimulant to the spinal cord. In large doses both paralyse the terminations of motor nerves. CATHIDINE is a muscle poison and a slight stimulant to the nervous system In man they all act chiefly on the cerebrum and spinal cord, causing stimulation or much excitement according to dose, and Cathine alone induces slight drowsiness at first.

Uses.—It may be described as a stimulant narcotic. It has been known for generations for its sustaining power. The activity of the leaves when used in an infusion in the same manner as tea or coffee, or when chewed (as by the Arabs), is stated to cause 'staying power,' wakefulness and refreshment. The action depends on the alkaloid *Cathine* and allied bodies. Further details in our last Edn. p. 272.

The drug, according to the Arabs, is thought to have power in strengthening the action of the bowels.

Extractum Cathæ.—*Dose.*—2½ to 10 grains (**0·18 to 0·6 Gm.**).

A solid extract made with 60% Alcohol, 1=4 of leaves for use in pill or **Tablets** (2½ grains each. *Dose* 1 to 4).

Extractum Cathæ Liquidum. *Dose.*—1 to 5 minims (0·06 to 0·3 Cc.). Strength 2=1, prepared with Alcohol 60%.

This preparation should be recently made.

Effervescent Catha and Phenolphthalein.—*Martindale.*

Dose.—1 to 2 teaspoonsful in ½ tumbler of warm water a good ½ hour before breakfast.

A tonic laxative combining the effects of the active principles of Catha with the mild purgative properties of Phenolphthalein.

Catha, Milk and Glycerophosphate.—*Martindale.* *Dose.*—A tablespoonful in a small cupful (4 to 5 ounces) of hot water.

Similar to Milk and Glycerophosphate with addition of Catha. Forms an agreeable beverage.

Catha Cocoa Milk. *Dose.*—1 tablespoonful, mixed with a small cupful of hot, nearly boiling, water, twice or thrice daily or as required.

CEREVISIÆ FERMENTUM.

Syn. FÆX MEDICINALIS. *Dose.*—½ to 1 ounce (15 to 30 Gm.).

The cells and spores of *Saccharomyces Cerevisiæ.*

All fermentations produced by living organisms (as in the case of yeast fermentation of sugar) are caused by definite chemical substances—ferments—produced in the cells of the organism. The ferment from the yeast cell was extracted in 1897 by precipitating yeast juice with 10 times the volume of Acetone, centrifugalising and washing the sediment with Ether and Acetone, and drying over Sulphuric Acid.

The phenomenon of Alcoholic fermentation, according to Harden, "is one in which an enzyme and a co-enzyme, a second enzyme-hexose-phosphatase, and in addition sugar, phosphate and the hexose-phosphate formed from these" are concerned. Harden and Young discovered that a soluble Phosphate markedly increases fermentation. Harden says, "In the case of the living yeast it may be conceived that the sugar which has diffused into the cell unites with the fermenting complex and undergoes the characteristic reaction with Phosphate, already present in the cell, yielding Carbon Dioxide, Alcohol and Hexose-phosphate" the latter is then decomposed and the liberated Phosphate again enters into reaction.—B.M.J. ii./11,22.

The fermentation of sugar can be effected by finely divided metals, *e.g.*, platinum. This goes to show that enzymes are catalytic agents. See also Nature, Mar. 3/10,28.

Fæxin. A dry powdered yeast. Pills and tablets are made *v. infra.*

Dose.—A teaspoonful with meals in water, beer, or milk.

Manufacture.

The Acetone method of drying consists in treating the yeast with repeated quantities of Acetone, pressing off and then treating with Ether and finally drying at not exceeding 45° C. Another method is to work in a partial vacuum over Sulphuric Acid at 42° C. (108° F.). Spread the Yeast in very thin layers.

Uses.—Internally both fresh yeast and the dried form are given to check boils and for acne. It is said that fresh yeast given *per os* grows actively in the stomach and slightly reduces sugar in diabetes. Yeast has been used for constipation as also in tuberculous affections and in dysentery.

The action of Yeast, it has been found, is not due simply to the property of inciting fermentation, as it is still effective after the yeast has been heated to 130° for an hour. Its action is virtually that of Nuclein.

Fæxin is a decided 'anti-Staphylococcic agent'—in cases of dyspepsia due to swallowing naso-pharyngeal pus, it acts gastrically, and probably by *direct* contact, as an antidote. It not only checks vomiting, but *after* 14 to 21 days' usage it will be noted that the patient loses the icteric complexion, and gets a healthy colour in the face. It takes some time to show *full* effects.—Campbell Williams.

Glycogen 5% (equivalent to 25% of the dried material) is a constituent of yeast.—Pavy and Bywaters.

Burns have been treated by either fresh or dried yeast made into a paste with tepid boiled water on sterile gauze bandages. Pain is relieved.

For the peripheral neuritis of mediterranean fever, yeast has been recommended in doses of two drachms, twice daily. (*cf.* VITAMINES).

Fæxin Extract. *Syn.* **Extractum Cerevisiæ Fermenti.**

By extracting fresh Yeast with Alcohol we obtain about 3% of oily extractive matter. This has been used for the various affections for which fresh and dried Yeast is employed, *e.g.*, in acne, erysipelas, furunculosis, folliculitis, leucorrhœa, diabetes, conjunctivitis phlyctenulosa, typhoid and acute articular rheumatism.

Fæxin Extract Pills and **Tablets** contain 3 grains (**0·2 Gm.**).

✱**Marmite** (T.M. 249997, 321670, 404589, Cl. 2), a palatable yeast extract, is rich in Vitamin B. It promotes growth in weakly children, assimilation of fat, produces leucocytosis in chronic septic conditions and increases general metabolism.

Vitamins are absent from meat extract. Apart from this fact, there is no available information to show that meat extract is better or *vice versa*. —A. Chapman, P.J. i./19,115.

Nuclein.

Dose.—15 grains (**1 Gm.**) several times daily.

Tablets, 1 grain (**0·06 Gm.**).

Is considered to be a compound of Nucleinic Acid with Albuminates and Carbohydrates. It tends to stimulate formation of white blood corpuscles, and hence to act as a bactericide. Septicæmia has been treated with it. Its subcutaneous injection is said to raise the opsonic power to an infecting organism. — De Backer's mode of treating tuberculosis and cancer.

Acidum Nucleinicum.

White powder somewhat soluble in water in the presence of a sufficiency of Sodium Hydroxide or Potassium Acetate. Its solution is acid to litmus paper. Insoluble in Alcohol.

J. J. Blackie, in a note on Pharmaceutical nomenclature, supports our divisions of these compounds.—P.J. ii./21,543.

Commercial Nucleic Acid should contain not much less than 15% Nitrogen and 9% organic Phosphorus on the dry material.—A. C. Chapman, Analyst, 1918, 43, 259; see also Y.B.P., 1919, 148.

Dose.—15 minims (**1 Cc.**) of a solution made with Alkali *q.s.*,

v. infra, hypodermically. **Sterules, Hypodermic,** contain ¾ grain in 15 minims (**0·05 Gm. in 1 Cc.**). Much larger amounts have however been given, *vide infra.* *Per os* ½ to 2 grains.

When ***NUCLEINIC ACID*** *is* ***ordered for injection*** *it is best to give the equivalent in the form of* **Sodium Nucleinate,** *the Sodium Nucleinate being prepared from Nucleinic Acid and a sufficiency of Sodium Carbonate to make it neutral to litmus. The writer is in the habit of employing a 5% Sodium Nucleinate solution when a saturated solution of Nucleinic Acid is ordered for injection. Sodium Nucleinate solutions should be prepared with the addition of Normal Saline and a sufficiency of Phenol for preservative purposes.*

Uses.—In treatment of anæmia, scarlet fever and puerperal fever, also in tuberculosis. To increase leucocytosis, and also the resistance of the patient in typhoid.

Sodium Nucleinate Solution 2 Cc. containing 0·05 Gm. per Cc. intramuscularly increases leucocyte count; found of value in influenza.—J. Graham Willmore & F. M. Gardner-Medwin, L. i./22,116. See also Gardner-Medwin, B.M.J., July 12, 1924.

To produce hyperleucocytosis in the treatment of general paralysis, Donath uses the following solution :—

Sodium Nucleinate 2, Sodium Chloride 2, Water 100. He recommends 7 injections at intervals of 5 days, the first being 50 Cc., and subsequent 100 Cc., injected into subcutaneous tissues. If a febrile condition is not produced larger doses up to 180 Cc., may be used. The author of the paper, however, has not had success with the method.—W. H. B. Stoddart, M.P.C. i./14,331

Progressive paralysis treated by Sodium Nucleinate on the basis that leucocytosis should be the aim.—O. Fischer, L. ii./22,537.

✱**Phlogetan** (T. M. 424927). A nucleoprotein compound used by injection of a series of graded doses from 1·5 Cc. upwards in the treatment of general paralysis of the insane and tabes dorsalis.

The action appears to depend on the production of a local inflammation. Also advocated by the makers in angina and rhinitis.

Bismuthi Nucleinas. *Dose.*—20 (**1·2 Gm.**) to 40 grains (**2·5 Gm.**). Yellowish powder containing 50% Bi. Insoluble in water and in dilute acids, splits up in the intestines, hence used as astringent for chronic intestinal catarrh. Was used on children under 2 years of age, also in cases of tuberculous diarrhœa with benefit.

✱**Nargol** (T.M. 228097), ✱**Mercurol** (T.M. 228096) and **Cuprol** are compounds of Nucleinic Acid with respectively Silver, Mercury and Copper. Cuprol and Nargol are of use in granular ophthalmia in the form of 5% instillations. Nargol is soluble in water 1 in 4. Contains about 10% Ag.

Nargentol is stated to be a silver nucleinate.

℗CHLORAL HYDRAS (*Off.*). U.S., P.G.V., P. Jap., P. Helv

$C Cl_3.CH.(OH)_2 = 165·414$.

Trichlorethylidene Glycol.

Dose.—5 to 20 grains (**0·3 to 1·2 Gm.**) in aqueous solution, or in chloroform water well diluted. Fr. Cx. has *maximum single dose* 60 grains, during 24 hours 180 grains approximately.

Manufacture.—This compound is obtained by the action of dry Chlorine upon Alcohol. Chloral-alcoholate, the principal product of the reaction, is then decomposed with Sulphuric Acid. Chloral thus produced is hydrated by bringing it in contact with the necessary quantity of water, warming to about 50° C., and allowing it to cool. A note on the procedure.—C.D. ii./14,336.

Soluble 4 in 1 of water, 5 in 1 of alcohol, 2 in 1 glycerin, 2 in 1 of ether, and 1 in 3 of chloroform, likewise soluble in oils and fats.

Flavoring.—Glyl Rosæ, Glyl or Syl Sassafras, Syl Amygdalæ Amaræ; Syrupus Aurantii Floris.

Uses.—As a hypnotic, it is often combined with opiates, morphine or bromides, but it is incompatible with quinine. Its use is contra-indicated in heart affections, Bright's disease, and when the vital force is very weak. Its sedative action resembles that of chloroform.

Severe chorea has been treated by inducing prolonged sleep with its aid. It is given in tetanus. In epilepsy small doses may be efficacious.

Antidotes to Chloral.—Keep patient awake, apply strong ammonia to nostrils. Stomach pump or emetics (zinc sulphate 20 grains), followed by amyl nitrite, coffee, electricity, oxygen, picrotoxin, or strychnine. It is useful as an antidote to poisoning by strychnine.

(For Antidotes to ***Chloral*** when in ***conjunction*** with ***Morphine,*** see **Antidotes to Poisons.**)

Incompatible with alkalis, ammonium salts, potassium iodide or permanagate, and with bromides in presence of alcohol,—chloral-alcoholate may separate; also with Magnesia, Chloroform and Magnesium formate may be produced. Liquefies with camphor, *q.v.*

In asthma chloral hydrate 30—40 grains is often useful.—Yeo.

In puerperal eclampsia—control of fits by Chloral and Morphine regarded in France as almost specific—increasing dosage:—

1st hour, Morphine Hydrochloride ¼ grain hypodermically; 2nd hour, Chloral 30 grains, *per os* or *rectum*; 3rd hour, Morphine ¼ grain, hypodermically; 7th hour, Chloral 30 grains; 13th hour, Chloral 25 grains; 21st hour, Chloral 25 grains —B.M.J. ii./12,1128.

Sea-sickness has been treated with drachm doses of a mixture of 2 drachms of Syrup of Chloral with 30 grains ammonium bromide, made up to 1½ ounces with water.

Influenza treated with 2% solution as gargle.—*See* Therap. Index—Influenza.

Preparations.

℗ **Chloral Camphoratum,** B.P.C. (Pigmentum Chloral et Camphoræ, T.H.).

Chloral Hydrate 1, Flowers of Camphor 1. Sp. Gr. 1·223.

Combine in a warm mortar. It remains liquid at ordinary temperatures, and forms a valuable application painted on painful parts in neuralgia and rheumatism. It mixes freely in alcohol, ether, oils and fats, but the camphor is precipitated on adding to water or glycerin. Cocaine 10% or less may be incorporated.

The compound (chloral and camphor) dissolves the alkaloids atropine, morphine, and veratrine to the extent of 1 in 30 or more, but their salts are less soluble in it. Liquefactions of a similar kind take place on mixing and gently heating respectively chloral hydrate 1 with menthol 1, or phenol 3, or thymol 1. Quinine salts and chloral hydrate also form liquid combinations.

In fibrositis the mixture of chloral hydrate, camphor and menthol is found to be satisfactory. Painted over the part, then gently rubbed in with the fingers.—A. P. Luff, Clin. Jl., Oct. ii./05.

Ⓟ **Pigmentum Chloral Compositum**—W. H. has Chloral Hydrate 1, Menthol 1, Thymol 1, Camphor 3.

Linimentum Chloral Compositum.—R.D.H. is the same.

L.H. has Chloral Hydrate, Menthol, Camphor of each 1.

Ⓟ **Chloral Tannin Solution.**—*Syn.* CAPTOL.

Chloral Hydrate 1, Tannin 1, melt together on water-bath and dissolve in water, *q.s.* to produce 8. For strengthening the hair.

Lotio Crinalis R.N.H.

Chloral Hydrate 10 grains, Salicylic Acid 10 grains, Mercuric Chloride ¼ grain, Glycerin 20 minims, Acetone ½ ounce, Alcohol 90% to 1 ounce.

Ⓟ **Liquor Bromo-Chloral Compositus.** B.P.C., 1901.

Dose.—½ to 2 drachms (**2 to 8 Cc.**). 1 drachm contains nearly 10 grains each of Chloral Hydrate and Potassium Bromide.

Chloral Hydrate 1,600 grains, Tincture of Indian Hemp 400 minims, Tincture of Fresh Orange Peel 400 minims, Henbane Juice 1,600 minims, Syrup 3¾ ounces, Liquid Extract of Liquorice ½ ounce. Dissolve, add Potassium Bromide 1,600 grains dissolved in Distilled Water 7 ounces. Filter and add Distilled Water to 20 ounces.

Resembles the American hypnotic Ⓟ ***Bromidia** (T.M. 45813), which is stated to contain in each drachm chloral hydrate 15 grains, potassium bromide 15 grains, extracts of cannabis and of hyoscyamus ⅕ grain each.

Dose.—½ to 1 drachm in syrup or water.

Ⓟ **Enema Chloral, L.H.** Chloral hydrate 10 to 40 grains, starch enema to 4 ounces.

Ⓟ **Suppository of Chloral.**

Chloral Hydrate 5, Oil of Theobroma 10. In grains, for one suppository, in grammes, for fifteen. Press into moulds. Heat must not be applied. It is useful in infantile convulsions, where nothing can be administered by the mouth. It should be forcibly retained for a few minutes with the finger, if necessary. It is locally irritating.

Sea-sickness has been treated by 20 grains per rectum.

Ⓟ **Syrupus Chloral** (*Off.*). *Dose.*—½ to 2 drachms (**2 to 8 Cc.**)

Chloral Hydrate and Water *a.a.* 20% in Syrup.

Ⓟ **Tablets of Chloral,** 5 and 10 grains (**0·3 and 0·6 Gm.**) *to be dissolved—not swallowed whole, might blister. Dose.*—1 or more.

Chloralamide. *Syn.* **Chloral Formamidum** (*Off.*)

$CCl_3CH(OH)NH.COH = 192{\cdot}435$.

Dose.—15 to 45 grains (**1 to 3 Gm.**) in weak spirituous or acidulated solution. *Max. single dose* 4 Gm. Max. in 24 hours 8 Gm.

PATENT: 7391/1899 ***Expired.*** TRADE MARK: A *device* with name and address was registered 95188/1890, renewed 1903 and 1918.

In colourless inodorous shining crystals with a faintly bitter taste.

Manufacture.—By combining anhydrous Chloral 147 with Formamide 45 and recrystallising from Alcohol about 70%—care being taken not to heat above 55° C.; soluble about 1 in 20 of water, 1 in 2 of alcohol. Must not be heated over 55° C. It melts at 114–115° C. Incompatible with alkalis.

The toxicity of a brand of Chloralamide made by the author, August, 1916, was tested by a physiological expert and found to

be less than that of Chloral Hydrate and not greater than that of the Chloral which it would yield on hydrolysis. It appeared therefore to be a safe hypnotic. The details showed that up to 70 mgr. per 100 Gm. of frog were tolerated in the case of Chloral Hydrate while up to 100 mgr. were tolerated in the case of Chloralamide.

Uses.—Hypnotic in insomnia of alcoholism, neuralgia, hysteria and cardiac diseases. Even 60 grain doses given.—B.M.J. i./09,555.

For insomnia and sea-sickness, Chloralamide and Potassium Bromide of each 15 grains, with Orange Tincture and Chloroform Water recommended. It acts if given as an enema.—*Hale White.*

Elixir Chloralamidi. *Dose.*—1 ounce (**30 Cc.**)=30 grains (**2 Gm.**) Chloralamide 2 Gm., Alcohol 5 Cc., Aromatic Syrup 5·4 Cc., Glycerin 15 Cc., Water *q.s.* to 30 Cc.

Haustus Chloralamidi, G.H.

Chloralamide 30 prains, Mucilage of Tragacanth 1 drachm, Chloroform water to 1 ounce.

Tablets, 5 grains (**0·3 Gm.**). *Dose.*—3 or more.

Chlorobrom. *Dose.*—½ to 1 ounce. A specialty said to contain 30 grains each of chloralamide and potassium bromide in an ounce, flavoured with liquorice, for insomnia and sea-sickness.

℗**CHLOROFORMUM** (*Off.*) P.G.V., U.S., P. Jap., P. Helv. Fr. Cx. $CHCl_3$=119·393.

℗*Chloroform and all preparations or admixtures containing more than 20% of Chloroform.*

Syn. Trichloro-methane; Formyl Terchloride.

Dose.—1 to 5 minims (**0·06 to 0·3 Cc.**), in mucilage and water, or in a perle; 3 drops=1 minim. Small doses may be given as chloroform water or spirit of chloroform. Very large amounts (up to 2 ounces) have been taken internally without causing death.

For Manufacture, History and testing of Chloroform see Vol. II.

A little caustic lime added to a bottleful will neutralise any acid products that may form in it.

Pink Chloroform and **Green Ether** suggested to prevent accidents. —B.M.J. ii./14,241

℗**Acetone Chloroform** specially prepared for anæsthesia. Should be kept in amber-coloured, stoppered bottles or in the dark.

Chloroform has Sp. Gr 1·490 to 1·495 @ 15·5° C. Boils at 60°—62° C. Miscible in all proportions with Alcohol, Ether and Oils. It may (*Off.*) be made from Alcohol, Industrial Methylated Spirit or Acetone. Sp. Gr. 1·483 to 1·487, and contains 2% Alcohol added.

Uses.—Inhaled it is anæsthetic and analgesic. Internally is antispasmodic and sedative for asthma, colic, cough, and neuralgia.

In sea-sickness, one or two drops of chloroform on a lump of sugar or in a wineglass of iced soda water, repeated every fifteen minutes often give relief.

Externally in liniments to promote absorption and allay pain, as in neuralgia and sciatica. *See* General Preparations of Chloroform. 1 in 500 is a preservative of Infusions and Animal Extracts. It is a useful deodorant, *e.g.*, for the hands after post-mortem work.

Intestinal parasites, *e.g.*, *Ankylostoma, Trichocephalus, Ascarides* and *Oxiurides* are well treated by doses *per os* of 3 to 4 Gm. mixed with Castor Oil or Olive Oil. It is a panacea also against all forms of external parasitic infection—*e.g.*, a 20 to 30% Chloroform in a fatty ointment base.—G. Alessandrini, L. ii./15,346.

Anaesthetic Uses and Preparations of Chloroform.

Vernon Harcourt Regulator. (See B.M.J., July 18, 1903). Permits of accurate dosimetry whilst being entirely under control of the anæsthetist. It supplies up to a maximum of 2% admixture of chloroform vapour with the air inspired.

The Chloroform (about 2 ounces) is contained in a conical glass bottle which is connected with one side of a T-shaped metal mixing and delivery tube. The opposite side of the T tube admits the air. Valves in glass chambers on each side show by their opening and closing that inspiration is proceeding properly—in fact the click they produce can be heard by the anæsthetist if his attention is otherwise occupied. The vertical portion of the T forms the delivery tube of the mixed chloroform and air. The regulator which is worked by moving a pointer on a dial is placed at the junction of the two inlet arms of the T with the delivery tube.

To approximate accuracy the temperature of the chloroform has to be between 16 and 18° C. This is arranged for mechanically by a couple of glass beads—both float if the temperature is below 16° C., and both sink if it is above 18° C. The slightest warmth, *e.g.*, of the hand, can be used to adjust.

When the pointer on the dial is at the end of the arc nearest the chloroform bottle the maximum quantity—2% is being given; when at the opposite end only air is passing. The intermediate lines on the dial show 1·8, 1·6, 1·4, 1·2, 1·0, 0·8, 0·6, 0·4 and 0·2%. The valves above mentioned open correspondingly and prevent the entrance into the apparatus of expired air.

In general, the anæsthetist begins with 0·2% and moves the pointer onwards towards the chloroform bottle at the entrance of one division about every half minute—up to 1·6 or 1·8%. To maintain narcosis 1% or less (0·5%) will be sufficient. It will be understood that a fall in temperature of the chloroform is caused by evaporation consequent on inhalation which will produce a smaller delivery of Chloroform. Any shaking, on the other hand, of the bottle would increase the amount. These results can be allowed for at once by moving the pointer.

The neck of the chloroform bottle has in recent patterns of the apparatus a metal collar which enables up to 2·5% chloroform vapour to be given. In some cases this amount may be required.

In use, care must be taken that the face mask fits *closely* to the face. Rolls of moist gauze, wool or lint round the nose may be required. After prolonged administration and the appearance of slight duskiness a little air or warmed oxygen should be given. This can enter through a tap in the face piece.

Diagrams and further details are given in "Anæsthetics" by Dudley Buxton (H. K. Lewis) on which the above description is based.

Shipway's Apparatus (L. i./16.70). The most satisfactory way of giving chloroform or ether. Warmed mixture of air and anæsthetic vapour in operations for abdominal wounds in war. Patient recovers consciousness quickly and vomiting is rare.—C. Wallace and G. Marshall, L. i./17,640.

Administration of Chloroform either alone or with A.C.E. or Ether on the open Mask.

The following is "a rough sketch" of the usual procedure :—

"The patient who, according to instructions, has been breathing steadily and counting aloud, begins to waver and to make errors in enunciation and then, either with or without a stage of excitement, passes into complete anæsthesia. The pulse slows down, and becomes regular, the respirations become regular and blowing, the flaccid cheeks being puffed out with each respiratory effort ; the whole muscular system becomes limp, and the pupils become moderately contracted and fixed. The chin must be maintained pulled up ; respirations must always be audible, even loud ; pulse must be frequently taken and pupils watched. These are the three indicators.

Pulse.—Pulse greatly accelerated generally means that the patient is coming out and is liable to be sick shortly. If pupils or conjunctival reflex confirm this, push the anæsthetic. Pulse becoming weak, irregular or slower, indicates a state of faintness,–remove mask. If collapse supervenes commence stimulatory measures,—the head to be lowered and body tilted up. Ether and Strychnine hypodermically ; gag to be inserted. See that the pharynx is free from mucus by pulling tongue forward. Rectal injection of Brandy, cold water to face and ears ; hot cloths over pericardium and (to the adult) artificial respiration. In the case of an infant or child the operator doubles a fist into the child's epigastrium to prevent distension of the stomach, covers the child's mouth with a layer or two of gauze, and placing his mouth over the child's, blows the lungs up. The air is then expressed from the lungs and the procedure repeated several times.

Pupils.—When the conjunctival reflex can be elicited, or when the pupils begin to respond to the stimulus of light, more anæsthetic is required. "Pin point" pupils may either mean profound anæsthesia, in which case remove mask, or patient is coming out,—other evidence will indicate what should be done.

When the pupil becomes dilated remove mask, draw both upper eyelids back rapidly and simultaneously. If patient is coming round response will be obtained,—push the anæsthetic. If no response patient is in a state of collapse and requires to be promptly stimulated as described above.

Respiration.—Should the respiration tend to become too quiet failure of respiration should be corrected,—this may be done by closing one of the nostrils with the finger,—this will have the effect of acting as a stimulus to deeper respiration. Keep lower jaw pushed

forward and pharynx clear of mucus, also see that tongue is well forward. The loop handle of a sponge holder, using the upper alveolar margin as fulcrum is useful to bring tongue forward in the case of children. Vaseline should be smeared over the parts most likely to come in contact with the mask,—thus preventing burning the patient's skin with the overflowing anæsthetic.—W. Rankin.—Pr. 1911,259.

Combined Use of Chloroform and Oxygen.—This is conducted by passing the oxygen through a wash-bottle containing the anæsthetic. The quantity of the chloroform or ether is, however, relatively small in comparison with the oxygen passed through. Alternatively a funnel-shaped leather inhaler containing a piece of spongiopiline or felt is used. In the upper surface of the leather inhaler is a small metal tube for connecting with the oxygen supply, thus a definite quantity of anæsthetic is given and the amount of oxygen can be varied as desired.

Crile's Nasal Tube method of giving Chloroform (with a little oxygen), preceded by Morphine and Atropine.—L. ii./09,364.

Antidotes.

Instructions for treatment if dangerous symptoms arise during inhalation of chloroform, (For Antidotes to ***chloroform swallowed*** *see* **Antidotes to Poisons.**) See that the airway is clear and the clothing loose. Place patient upon the floor with legs held up so that the abdomen is at higher level than the brain. Artificial respiration by tongue traction (*Pull out the tongue*) and Sylvester's or Schafer's method.—R.D.H.

Amyl Nitrite to the nostrils and inject hypodermically 1 drachm of ether or brandy or $\frac{1}{30}$ grain of **strychnine.** Hot flannels should be placed over the heart.

Caffeine hypodermically or **Brandy** per rectum.

Inversion of the body has frequently saved patient.

Atropine is useful. The fibrillation of the heart from which death under chloroform frequently arises can be remedied by its subcutaneous use.—'Medical Officer,' May 8, 1915.

Sodium Lactate Solution. Copious rectal injection recommended to restore alkalinity of the blood—assuming acetone and diacetic acid are products of the effects.—M.P.C. i./07,200.

Lavage of Stomach with 2 litres of **warm Sesame Oil** for poisoning, until the washings were free from odour of Chloroform, afterwards Saline Injection. Recovery.—P.J. ii./09,364.

If $\frac{1}{4}$ grain of morphine be first injected hypodermically, less Chloroform is needed, the insensibility is more profound, and the danger attending its use is lessened.

Heart massage in Chloroform Syncope by the subdiaphragmatic route often induces recovery.—B.M.J. ii./09,1471.

Decomposition products, are Carbonyl Chloride, Hydrogen Chloride or free Chlorine. These would be noticed before use, and in any case would only produce unpleasant symptoms.—B.M.J. i./12,508.

The Sickness produced by Chloroform tends to be more severe when the anæsthesia has been prolonged. Chloroform acts as a depressant, but it also excites the secretion of glands, chiefly the sali-

vary glands. At the beginning of an administration of the drug, especially when the chloroform is being pushed to get the patient under, saliva is being swallowed in large quantities. It is saturated with chloroform. Mucus is secreted copiously. The gastric glands are pouring out a strongly acid secretion. A powerful irritant is thus collecting in a comparatively empty stomach. A gastritis is set up. When the effect of the general anæsthetic is passing off, the lowest functions, such as muscular tone, are the first to reappear. The irritated stomach tries to get rid of its tormentor and vomiting begins. The mucus is tenacious and vomiting is prolonged. The gastritis adds to the severity and painful character of the retching. The stomach contents are often so acid that the patient's lips and cheeks are excoriated by the vomit.

The treatment for such cases is large draughts of **Sodium Bicarbonate** dissolved in hot water, aided by counter-irritation over the epigastrium. This neutralises the acid, dissolves or loosens the tenacious mucus from the stomach walls, and dilutes the irritant in the stomach.

Hot fomentations or light poultices with or without mustard or blisters are efficient counter-irritants for the epigastrium. A dilute **Hydrocyanic acid, Bismuth, and Soda Mixture** acts well, and in some cases with a foul tongue, powders of rhubarb, bismuth and soda are useful to cure gastritis. Such treatment relieves the patient of the distressing heartburn which generally follows severe sickness. Oxalate of cerium is sometimes of use. Morphine increases the sickness, possibly by causing flatulent distension, but is sometimes of use in giving the patient a short rest when suffering severe pain, or when worn out with the constant retching. A combination of **Scopolamine and Morphine**, when given as an aid to general anæsthesia, is better. The patient rests well with little sickness the first night after the operation, and there is less trouble with gas distension than with morphia alone.

After most abdominal operations flatulence is relieved by giving *Saline per rectum*—1 pint to 1 quart every four hours—leaving in a rectal tube for an hour or so between times. Rubbing the abdomen adds to the comfort of the patient, more vigorous treatment may be required, such as turpentine enemata. If the violent sickness still persists on the second day, castor oil or magnesium sulphate should be given by the mouth. Although these drugs are more often rejected, a certain quantity stays down and will do good. If the bowels do not act in six hours an enema of soap and water will prove effectual. Peristalsis returns and gas does not accumulate. The patient's strength, which is failing under the stress of the constant sickness, can be sustained by rectal enemata of brandy and water and sips of brandy by the mouth.

In abdominal operations when the vomit is hæmorrhagic and resembles beef-tea dregs or coffee grounds, carry out the above treatment for flatulence, stimulate the patient, give copious draughts of hot soda solution. From whatever cause, there is a leak of blood

into the stomach, this must also tend to increase sickness already present. By washing out the stomach with a rubber tube and funnel we get rid of that blood which has already collected, but it goes on collecting. Follow this with 5 to 10 minims of adrenalin solution (*note however contraindication below*) in a little water. The vomit will no longer be hæmorrhagic, and the sickness soon disappears. A number of cases healed in this way with good results. In animals poisoned with chloral or chloroform until the pulse has almost ceased, the circulation may be restored immediately by this treatment. Suprarenal thus used probably stimulates the muscles of the stomach walls, blanches the dilated capillaries, and sets up regular rhythmical contractions of the stomach, which cause its contents to follow their natural course and to flow on into the duodenum.—J. W. Keay, Pr., Nov. 1910, p. 706.

Small doses of chloroform on a lump of sugar sucked when desire to vomit comes on give brilliant results. The idea was hit upon by analogy with the fact that confirmed "Spreeërs" get best result for alcoholic vomiting with small doses of alcohol.

Death-rate with chloroform is about 7 times as great as that with ether (1 in 13,500).

Bibliography of untoward results with chloroform, vide Vol. II.

Glucose is useful in delayed poisoning following chloroform inhalation. In one case—a boy who had taken chloroform upon a previous occasion without detriment—recovered under a mixed treatment of alkalies and glucose, *vide* Glucose.

Chloroform and Ether.—Respective values of the Methylated Spirit and Rectified Spirit products. Opinions of the leading anæsthetists about equally divided.—Sir F. Hewitt and H. Robinson hold there is no difference.—L. ii./12,1233.

Adrenalin in Chloroform Anæsthesia. — Death following injection of 5 minims of Solution (1 in 1000) with light Chloroform anæsthesia in an operation for deflected nasal septum. When Chloroform anæsthesia is deep the danger of injecting Adrenalin is less than when light.—B.M.J.i./13,879. It should not be given to a patient under Chloroform.—*Ibid*, p. 704. Death probably caused by Adrenalin getting into the blood stream.—B.M.J.i./13,1028. General anæsthetic not necessary.—*Ibid*, p. 1350.

Chloroform is toxic for heart muscle. Adrenalin is contraindicated wherever Chloroform is employed and *vice versa*.—W. J. R. Heinekamp., Jl. Pharm. and Exp. Therap., Nov. 1920.

Death under Chloroform given by a nurse.—B.M.J. ii./13,829.

Increased risk of fatal acidosis after Chloroform in presence of abdominal sepsis.—R. Apperly, B.M.J. ii./12,624.

Tracheal administration of anæsthetics (Chloroform) by means of an orotracheal catheter prevents the admission of blood to the air passages.—Wm. Hill, B.M.J. ii./13,745.

℗**A.C.E.** (Alcohol, Chloroform and Ether).

Absolute Alcohol, Sp. Gr. 0·795, 1 ; Chloroform, Sp. Gr. 1·495, 2 ; Purified Ether, Sp. Gr. 0·720, 3 ; Sp. Gr. about 1·002. The three ingredients are intended to evaporate uniformly.

A.C.E. is as effective as pure Chloroform, and a safer agent when deep and prolonged anæsthesia is to be produced, while at the same time it is sufficiently rapid in its operation to be convenient for general use, although it takes a longer time than Chloroform (10 to 15 minutes) to procure anæsthesia. It is of service in midwifery.

℗ **C.E.,** *i.e.*, a mixture of chloroform 2 parts with ether 3 parts, is an even better anæsthetic mixture in some cases, *e.g.*, where the airway is encroached upon as in angina Ludovici, in thyroid enlargement, in sublingual abscess, etc.

This mixture in same proportions using a Skinner's mask employed in a variety of grave operations—panhysterectomies, removal of double pyosalpinx, difficult appendicectomies, excisions of rectum, &c. Time of induction of anæsthesia averaged about 8 minutes. The mixture is recommended.—L. ii./09,11.

In general cases C.E. is best. L. ii./07,140. Death under—due to vomiting.—L. i/11,1350.

As anæsthetic, "C_1E_2." In adenoids and enlarged tonsils this is best—B.M.J. i./09,1354.

The addition of a small amount of Chloroform to Ether, *e.g.* the proportion $E_{16}C_1$ (by volume) distinctly saves the work of the lungs and heart, a factor of importance in a long operation. Irritation caused by ether given by the "closed" method is reduced Safe and rapid, useful for soldiers. A few drops of E_2C_1 preferable to ethyl chloride as preliminary to giving ether or $E_{16}C_1$.—W. J. McCardie, B.M.J. i./17,508.

℗ **Vienna Mixture** is Chloroform 1, Ether 3.

Choice of an anæsthetic.—Dudley Buxton advocates 1 in 10 Alcohol and Chloroform by the open method in preference to A.C.E. or C.E, while the anæsthesia is to be maintained in medium aged children right through the operation.—P.R S.M. Anæsth. Sectn., Apl. 1910, p. 65.

Anaesthol. A mixture of Ether and Chloroform—in proportions determined by the anæsthetist—with 17% of Ethyl Chloride. Used by Gwathmey in adenoid and tonsil operations. Gas and oxygen are passed over the preparation for inducing anæsthesia and gas—oxygen—ether for maintaining.—J.A.M.A., N.Y.M.J. June 19, 20, p. 1065 per Pres., Feb. '21,36.

Tissues exposed to various concentrations of Ether and Chloroform. There was greater reversibility on low organisms, Yeasts and seeds and *Chlamydomonas* with Ether than with Chloroform.—A. L. Fleming, B.M.J. ii./22,921.

General Preparations of Chloroform.

Aqua Chloroformi (*Off.*) and P. Jap.—1 in 400 of water.

Dose.—½ to 2 ounces **(15 to 60 Cc.).**

Salts, like sodium sulphate, are apt to cause deposition of chloroform from aqueous solution.

℗ **Chloroform Sterules** *for Inhalation.—Martindale.*

Encased in cotton wool and silk; contain 10 minims in each. Are convenient for use in asthma, &c.; may be fractured and used by the patient while in bed. In angina pectoris Chloroform inhalations —"so far from being unsafe in cardiac disease, are often of the greatest use and perfectly safe." In croup brief inhalation of Chloroform acts promptly.—Whitla. Yeo.

Sterules are also made containing 20, 30, and 60 minims—the last for obstetric purposes avoiding risk of overdose.

Recent research has shown that in some cases of angina pectoris, the blood pressure is too low, instead of being increased as is commonly supposed; in such cases chloroform inhalation may be dangerous.—B.M.J. ii./13,319.

Ⓟ **Gelatin Capsules of Chloroform.** *Dose.*—One or two.
Contain each 5 minims ; are for similar uses, but the chloroform is apt to volatilise ; PERLES 3 minims. Very useful in sea-sickness.

Ⓟ **Chloroform and Ethyl Iodide Sterules,** *v.* Ethyl Iodide.

Ⓟ **Chloroformum Camphoratum, B.P.C.**
Camphor 2, Chloroform 1.
Useful for toothache, applied on cotton wool

Ⓟ **Chloroformum Mastiche.**
Mastiche 1, Chloroform *q.s.* to 2.

Ⓟ **Guttæ Chloroformi cum Menthol Compositæ.**—SELF-INFLATOR DROPS. Menthol 20 grains, Chloroform ½ ounce, Acetic Ether and Alcohol 90% of each 2 drachms.—*Dundas Grant.*

Directions.—5 drops to be placed upon the wool in the inflator on each occasion of use.

In cases of chronic tympanic and Eustachian catarrh ; value depends to some extent upon the ease with which air containing a little chloroform vapour passes up the Eustachian tubes. Inflation with an **Eustachian Self-Inflator** is to be conducted as follows :—Drop the amount prescribed on to the wool in the mouth-piece of the inflator by means of a medicine dropper. With the glass mouth-piece held firmly between or against the lips (according to the form of the instrument) and the nosepiece tightly in the freer of the two nostrils, compress the other nostril to close it completely. Draw a breath (not through the instrument) and then blow through it so as to puff out the cheeks and 'crack the ears.' If vapour is too irritating blow through the instrument a few times before use. To concentrate the effect on the right ear close firmly with the finger the *left* ear and bend the head sideways over the left shoulder—*vice versa* for the left ear.—C.L.T.E.

The duration of treatment should be controlled by the prescriber.

Ⓟ **Linimentum Chloroformi** (*Off.*).
Chloroform 1, Liniment of Camphor 1.
Vaseline might with advantage replace the oil of the camphor liniment for this preparation. U.S. orders Chloroform 3, Soap Liniment 7.

℞ ℙ **Liquor Chloromorphiæ, Chloromorphia Solution.** (*Miscible.*)
Dose.—5 to 15 minims (**0·3 to 1 Cc.**).
Chloroform 150, Glycerin 400, Liquid Extract of Liquorice 100, Morphine Hydrochloride 10, Solution of Atropine Sulphate 20, Oil of Peppermint 2, Alcohol (90%) *q.s.* to 1000.
10 minim dose contains :—Chloroform 1½ minims, Morphine Hydrochloride $\frac{1}{11}$ grain, Solution of Atropine Sulphate $\frac{1}{5}$ minim.
Dissolve the Morphine Hydrochloride in the Liquid Extract of Liquorice, Glycerin and Atropine Solution previously mixed : in part of the Alcohol dissolve the Chloroform and Oil of Peppermint ; mix with the morphine solution, and add Alcohol *q.s.* to 1,000.
A useful sedative, resembling the remedy Ⓟ **Chlorodyne,** (*Not* within D.D.A.) in active constituents. For the latter see also Proprietary Medicines chapter Vol. II.

℞ ℙ1 **Capsules** (gelatin) containing 5 minims for use of travellers are convenient.

℞ ℙ1 **Tinctura Chloroformi et Morphinæ Composita** (*Off.*).

Dose.—5 to 15 minims (**0·3 to 1 Cc.**).

Chloroform 75, Morphine Hydrochloride 10, Diluted Hydrocyanic Acid 50, Tincture of Capsicum 25, Tincture of Indian Hemp 100, Oil of Peppermint 2, Glycerin 250, Alcohol (90%) *q.s.* to 1000.

10 minim dose contains:—Chloroform ¾ minim, Morphine Hydrochloride $\frac{1}{11}$ grain, Dilute Hydrocyanic Acid ½ minim, Tincture of Capsicum ¼ minim, Tincture of Indian Hemp 1 minim.

Mix. Contains approximately four times the proportion of morphine present in the preparation of B.P. 1885.

N.B.—Contains Hydrocyanic Acid which the Chloromorphia Solution does not.

Poisoning by 4 ounces of Chlorodyne, with recovery by use of atropine, strychnine, and stimulants is recorded.

℗ **Tinctura Chloroformi et Morphinæ B.P. '85** (*Not* within D.D.A.).

Dose.—5 to 10 minims.

10 minim dose contains Chloroform ¼ minim, Ether ⅓ minim, Alcohol 90% ¼ minim, Morphine Hydrochloride $\frac{1}{48}$ grain, Dilute Hydrocyanic Acid ⅝ minim, Peppermint Oil $\frac{1}{80}$ minim, Liquid Extract of Licorice 1¼ minim with Treacle and Syrup *q.s.*

Ferrocyanide colouration of Tinctura Chloroformi et Morphinæ, B.P. 1885. A sample of this gave, on dilution with water and acidifying with Hydrochloric Acid, a green colour. Possible formation of Ferrocyanide from the Hydrocyanic Acid, the iron being present in the treacle.—C. M. Caines, P.J. ii./22,89.

Spiritus Chloroformi (*Off.*).—*Syn.* Chloric Ether. 1 in 20 of alcohol (90%). U.S. has 3 in 50.

Dose.—30 to 40 minims (**2 to 2·5 Cc.**), or 5 to 20 minims (**0·3 to 1·2 Cc.**) repeated.

Tinctura Chloroformi Composita. B.P. 1885. Chloroform 2, Alcohol 90% 8, Compound Tincture of Cardamoms 10.

Dose.—5 to 60 minims.

Emulsio Chloroformi U.C.H.

Chloroform 5, Quillaia Tincture 2, Water to 100. St. Th. H. uses Senega Tincture one third the quantity approx. *vice* Quillaia. Employed to preserve vegetable preparations.

Ethylene $CH_2 : CH_2 = 28·042$. *Syn.* Olefiant Gas.

The first known member of the Alkylene or Olefine series of hydrocarbons—*i.e.*, the series in which a double linkage occurs. Ethylene is a colourless gas with slight ethereal odour. It has Sp. Gr. 0·9784 (Air=1). It burns in air with a bright flame. A mixture with 3 vols. of Oxygen burns with violent explosion. At 0° C. and under a pressure of 42·5 atmospheres it is converted into a colourless liquid which boils at—102° C. The gas is very soluble in Alcohol and Ether. It is a constituent of illuminating gas.

As an anæsthetic, Ethylene has been experimentally shown to possess many advantages when deep surgical anæsthesia is required. A proportion of 80 to 90% of the gas is used. Analgesia comes on easily, respirations remain regular, no cyanosis or suggestion of asphyxia observed, and recovery from

the anæsthesia is always rapid. Is usually administered with Oxygen.—A. B. Luckhardt and J. B. Carter, Jl. A.M.A., 1923, Mar. 17, p. 765, B.M.J.E. i./23, 62: P.J. i./23,456.

For a review of its anæsthetic uses *vide* L. ii./23,240. There were 14 instances of vomiting in a series of 92 inhalations.

Acetylene. $CH{\equiv}CH = 26{\cdot}026$.

This, the initial member of the Acetylene series of hydrocarbons (*i.e.*, with triple linkage) is a gas with unpleasant odour. It has Sp. Gr. 0·92 (Air=1). It is compressible into a liquid. This *liquid* form has explosive properties. It is more soluble in Alcohol than Ethylene. It is formed by the well known interaction of water with Calcium Carbide.

Acetylene 40% and Oxygen 60%, with the addition of Oil of Pine to mask the smell, used as ***general anæsthetic.*** Rapid, simple and safe, but for child-birth, like all other general anæsthetics, its defect is to diminish uterine contractions.—C. H. S. Horwitz, L. i./23,619.

Give 60% to start with, increased to 70% for full anæsthesia and reduce to 20 or 30% in a long operation.—Precede with Morphine and Scopolamine.—L. ii./23,240.

Dichlorethylene. *Syn.* ACETYLENE-DICHLORIDE $C_2H_2Cl_2 = 96{\cdot}946$.

Is employed as a solvent of Iodine for sterilising the skin. 2·5% w/v is used, *i.e.*, practically a saturated solution. It is a mobile liquid with Sp. Gr. 1·25 and B. pt. 55° C. This solution is said to cause the operating surgeon or assistants no lachrymation or catarrh of the nasal mucous membrane which the Iodine Tincture produces.

N.B.—The name **Dichloride of Ethylene** has been applied to this substance, *v.* B.M.J. i./10,1288. It has the composition $C_2H_4Cl_2 = 98{\cdot}962$. B. Pt. 85° C. and Sp. Gr. 1·255 at 15° C., but it should be particularly noted that Dichlorethylene is required for the purpose.—P.J. ii./11,623.

Iodine in skin asepsis—comparative results with Dichlorethylene.—J. W. Peck, P.J., i./12,450.

✱WESTROPOL (T.M. 350667 and 352362, Class 2). A soap solution containing 25% Trichlorethylene and ✱WESTORAN (T.M. 433061)—a soap solution containing 95% Tetrachlorethane $C_2H_2Cl_4 = 167{\cdot}866$ were found efficient as vermicides. For cleaning the body bathing or sponging with soap solutions containing 2% trichlorethylene or 10% tetrachlorethane give good results. Further, a 25% solution of Trichlorethylene in vaseline would be an efficient insect pomade. Dichlorethylene also useful.—J. P. Kinloch, B.M.J. i./15,1038. It is used for washing clothes and removing grease in laundries. The name WESTRON is given as indicating Tetrachlorethane (without the soap).—P.J. ii./16,384; i./20,243.

Trichlorethylene $\begin{matrix} CCl_2 \\ \| \\ CHCl \end{matrix}$ = 131·398 Sp. Gr. 1·47, B.pt. 88°C.—difficult to volatilise though a good solvent, especially for fats.

Trichlorethylene Sterules, 10 minims (**0·6 Cc.**) encased in cotton wool for inhalation, are made.

Uses.—Inhaled for trigeminal neuralgia several times a day.—B.M.J.E. i./22,86.

Tetrachlorethylene, $C_2Cl_4 = 165{\cdot}85$. *Syn.* **Perchlor-Ethylene. Carbon Dichloride** (CCl_2). Heavy liquid (Sp. Gr. 1·619), B.pt. 110° to 120°, solvent of fats, resins, rubber and

alkaloids. Originally investigated by Faraday. Difficult to volatilise. Gives a heavy vapour which caused death in aircraft works when used in a cellulose varnish.—C.D. ii./14,845. (*cf.* Carbon Tetrachloride which is similar and has also produced death.)

All these bodies are non-inflammable and non-combustible.

CHRYSAROBINUM (*Off.*) U.S., P. Jap.

$C_{30}H_{26}O_7$ = 498·358. *Syn.* Commonly but erroneously called Chrysophanic Acid.

Dose.—$\frac{1}{6}$ to $\frac{1}{2}$ grain (**0·01 to 0·03 Gm.**) or more.

This substance was erroneously stated to contain 80 to 84% of Chrysophanic Acid, but it was subsequently shown that the Acid was developed from the Goa Powder (*q.v.*) by the Alcoholic Solution of Potash used in extraction.—B.M.J. ii./10,1593. It consists chiefly of Chrysarobin, with varying amounts of Chrysophanic Acid. *For further details see Vol. II.* It is obtained from Araroba (*q.v.*) by extraction with hot chloroform.

It might be renamed **'Araroba Purificata.'**

A tasteless inodorous crystalline yellow powder. It is contained in rhubarb (mainly as Chrysophanic acid) and dock root. Ash limit 1%.

Solubility.—In water only slightly; in ether 16, chloroform 12·5 (at 25° C., U.S.). We found recently (1914) 1 in 12 in Chloroform, 1 in 18 Benzol. 'Not readily' in hot alcohol (Dott). Partly and sparingly in petroleum spirit.

Uses.—Externally as ointment or pigment. Chrysarobin is a powerful stimulant and parasiticide in acne rosacea, alopecia, psoriasis, lupus, ringworm of the scalp, pityriasis and tinea circinata.

Psoriasis in the army treated by Chrysarobin and Salicylic ointments or in Lassar's Paste.—H. W. Barber, B.M.J. i./18,369.

Unguentum Chrysarobini (*Off.*).

This is now prepared same strength as B.P. '98, but with soft paraffin. U.S. has 3 in 50 of Benzoated Lard.

It stains the skin and hair, and a strong ointment after three days' continued use sometimes produces feverishness and irritation. 5 to 10 grains to an ounce may be better. Its stains can be removed by benzol, weak solution of potash or chlorinated lime.

Unguentum Chrysarobini Compositum (Unna) and St. J. H. Chrysarobin 5, Salicylic Acid 2, Ichthyol 5, Vaseline 88.

Psoriasis is treated by an ointment of Chrysarobin 5, Salicylic Acid $2\frac{1}{2}$, Birch Tar (Oleum Rusci) 5, Soft Soap $6\frac{1}{2}$, Vaseline $6\frac{1}{2}$.

Baculum Chrysarobini.

Chrysarobin 30 grains, Wax 20 grains, Lanolin 50 grains.

℗**Pigmentum Chrysarobini.**—*Adopted by G. H.*

Chrysarobin 1; Gutta Percha Solution (B.P. 1885), 9.

In psoriasis, painted on twice a day with a brush for ten days without washing—finally washing off.

℗**Traumaticin** (*Martindale*), adopted by **P. Belg.**, and PH. ITAL., composed of Gutta Percha (purified) 1, Chloroform (by weight) 9, is also used for making the above pigment. More cleanly than liniments or ointments. Can be prepared stronger in gutta percha if desired.

Pigmentum Chrysarobini et Pyrogallol.

Chrysarobin 1, Pyrogallol 1, Ether and Alcohol, of each 10, Collodion 120. Apply after bathing every third day for psoriasis and ringworm. Chrysarobin may also be applied with Camphoid, *q.v.*

℗**Suppositorium Chrysarobini.**

Chrysarobin $1\frac{1}{4}$ grains, Iodoform $\frac{3}{10}$ grain, Belladonna Extract $\frac{1}{7}$ grain, Glycerin *q.s.* to make a suitable paste and Cacao Butter *q.s.* to 30 grains. Found to give extraordinary results in hæmorrhoids.—U.S.D.

Araroba. *Syn.*, **Goa Powder** (*Off.*). **Crude Chrysarobin. Araroba Depurata, P. Austr.**=Chrysarobinum.

A brownish concretion from the cavities in the trunk of *Andira araroba* (*Leguminosæ*), dried and powdered.

Crude Araroba is imported from Brazil; not less than 50% of its weight is chrysarobin, or chrysophanic acid so-called. The Indian mode of using the drug was to cut a lime fruit, dip it in the powder and dab it on the affected skin. The Brazilians mix it with vinegar.

Eurobin. Chrysarobin-tri-Acetate. A brownish powder recommended as a substitute for chrysarobin. Solutions of 2 to 3% are said to be effective and free from toxic effects, non-irritant, and do not stain It is soluble in Ether, Chloroform and in Acetone. **Lenirobin is Chrysarobin-tetra-acetate.**

CINCHONÆ CORTEX.

(*Rubiaceæ*).

The principal dried barks used for the production of the salts of the Cinchona alkaloids are:—Red Cinchona bark, from *Cinchona succirubra*; Yellow Cinchona bark, obtained from *Cinchona Calisaya* containing upwards of 6% of alkaloids (half of which is quinine); pale Cinchona bark (crown or Loxa bark), from *Cinchona officinalis* (containing 5% alkaloids of which half may be quinine); the bark of *Cinchona lancifolia*, Mutis; Columbian bark (containing about 2% alkaloids, of which only small proportion is quinine); and other species of Cinchona; that of certain species of Remijia may also be used. The variety most used for making galenical preparations is the cultivated Red Cinchona.

Cinchona, U.S., is from various species. 5% total alkaloids. *C. rubra* is separately official.

C. CALISAYA, Quinquina Jaune, is official in FR. CX. for making Extract. 1000 Gm. of good Calisaya Bark should yield 30 Gm. of Quinine Sulphate ($+8H_2O$)=25 Gm. approx. of anhydrous Quinine Sulphate=22 Gm. approx. of anhydrous Quinine.

C. SUCCIRUBRA, FR. CX. Quinquina Rouge is to contain at least 50 Gm. total alkaloid=15 Gm. Quinine Sulphate ($+8H_2O$)=$12\frac{1}{2}$

Gm. approx. anhydrous salt dried at 100° C.=10·9 Gm. approx. of Quinine base anhydrous—per 1000 Gm. of bark.

The Quinine barks, as they are called, now imported from South America, are chiefly the Calisaya in quills; those known as Cuprea barks, the produce of species of Remijia, are more expensive. A larger quantity of cultivated bark, the produce of *C. succirubra*, *C. officinalis*, and hybrids, arrives from Madras and other parts of India, most of the rich Java bark, produced by *C. Calisaya, var. Ledgeriana*; has hitherto been shipped to Amsterdam.

The old natural "flat" Calisaya bark is not now met with, but a kind of yellow bark, pressed into flat pieces, is imported from Bolivia to replace it. The flatness is produced by tight packing in serons bound with green hide thongs which, contracting, keep it flat.

There is a large demand for **'Factory' Cinchona Bark**, *i.e.* barks of Cinchona Ledgeriana and certain Cinchona hybrids, rich in Quinine and containing comparatively small amounts of other Cinchona alkaloids, for making Quinine. Effort should be made to produce in India sufficient of the commodity to meet a much larger proportion of the requirements of the Empire There is at present only one Quinine factory making Quinine from bark in Great Britain.—Imp. Inst. Com. for India.—L. ii./22,526.

The **Amani Institute** (in what was German E. Africa) having passed into British hands, we are now in possession of some *C. Ledgeriana-C. Succirubra* hybrids which are amongst the most profitable species of Cinchona in the world from the standpoint of Quinine. Some were shown to yield up to 11·83% Total Alkaloid and 6·97% Quinine.—Prof. Greenish and C. E. Corfield, B.P. Conf., 1923, P.J. ii./23,95.

For further details on cultivation, etc., see Vol II

Cinchonæ Rubræ Cortex, Red Cinchona Bark (*Off.*). *Dose.*—5 to 60 grains (**0·3 to 4 Gm**). P. HELV. has minimum 6·5% alkaloids. FR. CX. has 5%, *vide antea.*

The dried bark of the stem and branches of cultivated plants of *Cinchona succirubra.* Tested by official process, it should yield between 5 and 6% of total alkaloids, of which not less than one-half should consist of quinine and cinchonidine.

Flavorings—as for Quinine *q.v.*

Decoctum Cinchonæ. B.P. 1885.—1 produced 16. *Dose.*—1 to 2 ounces (**30 to 60 Cc.**).

Elixir Cinchonæ. *Dose.*—½ to 1 drachm (**2 to 4 Cc.**).

Liquid Extract of Cinchona 1, Simple Elixir 7. Mix.

Extractum Chinæ.

Dose.—1 to 4 grains (**0·06 to 0·25 Gm.**).

FR. CX.—Aqueous extract containing not less than 6% alkaloids.

Extractum Cinchonæ Liquidum (*Off.*)

Dose.—5 to 15 minims (**0·3 to 1 Cc.**)

This contains 5% of total alkaloids, and is an acid preparation; 1=about 1 of bark

If prescribed with Acid, as in the following:—Spirit of Chloroform 1½ drachms, Nitro-hydrochloric Acid 1½ drachms, Liquid Extract of Cinchona 1½ drachms, Water to 6 ounces, mix the first three in order written, and pour into the water to produce best result.

Liquid extract of red bark has been much lauded in America for giving drunkards a distaste for alcohol.

Only about 20% of the total alkaloids in Cinchona can be extracted by Dilute Hydrochloric Acid as in making this liquid extract Glycerin does not exert a solvent action on the alkaloids: best to add it at end of the process. The B.P. 1898 Assay process is best.—O. Chick, P.J. ii./17,144; C.D. ii./17, 612.

For further Notes on Assay, see Vol. II.

Fluidextractum Cinchonæ, U.S. *Average dose.*—15 minims. Standardised to 4·5% alkaloids, *w/v*.

Extrait de Quinquina Rouge (Fluide) Fr. Cx. Supp. 1926, is made by percolation with dilute Hydrochloric Acid and contains 3·5% total alkaloids.

Tinctura Cinchonæ (*Off.*).

Dose.—½ to 1 drachm (**2 to 4 Cc.**).

About 1 in 5 of 70% alcohol; standardised to about 1% of alkaloids. **U.S.** not less than 0·8 or more than 1% of alkaloids.

Maceration for 24 hours with ½ ounce hide powder to the pint is said to detannate the tincture.

Mistura Antidipsomania. N.H.W. (Not in E.G.A.)

Tincture of Cinchona 1 drachm, Glycerin ½ drachm, Tincture of Capsicum 3 minims, Decoction of Cinchona to ½ ounce.

Tinctura Cinchonæ Composita (*Off.*).

Syn. Huxham's Tincture of Bark. About 1 in 10 of 70% alcohol. *Dose.*—½ to 1 drachm (**2 to 4 Cc.**). The Saffron is now omitted. **U.S.** is similar.

Vin de Quinquina Officinal (Fr. Cx.)

Macerate Cinchona 25 with Dilute Hydrochloric Acid 2, Alcohol 60% 75, for 24 hours shaking occasionally. Add Red Wine 920, macerate 24 hours and filter.

Dose.—½ to 5 ounces (**15 to 150 Cc.**). Less for children.

Vinum Chinæ. P. Jap. IV. Dose 1 to 4 drachms. Dissolve Gelatin 1, by warming in Distilled Water 10, and add Sherry 1,000, Cinchona Bark in coarse powder 40. Macerate for eight days; press and in the expressed liquid dissolve Sugar 100, Tincture of Bitter Orange Peel 2, set aside in a cool place for 14 days and filter.

CINNAMOMI CORTEX (*Off.*).

The dried bark from *C. zeylanicum* (*Lauraceæ*).

Dose.—10 to 30 grains (**0·6 to 2·0 Gm.**).

Aromatic, carminative and antiseptic, employed as flavouring agent. Contains volatile oil and tannin. Official are Compound Powder (1 in 3), Water (1 in 10), Spirit (also U.S.—1 of oil in 10), and P. Jap. IV. has Cortex Cinnamomi *Loureirii*, *Syn. Nikkei Bark*, Japanese Cinnamon Bark.

Tinctura Cinnamomi. (*Off.*). *Dose.*—½ to 1 drachm.

1 in 5 alcohol 70%. Alcohol 60% would do equally well.

Tinctura Cinnamomi Composita P.L.

Dose.—20 to 40 minims (**1·2 to 2·4 Cc.**).

Cinnamon Bark 16, Cardamom Seeds 8, Long Pepper 5, Ginger 5, Alcohol 60% 640. Macerate seven days.

Oleum Cinnamomi (*Off.*). *Syn.*, Oleum Cassiæ. **U.S.**

Dose.—½ to 3 minims (**0·03 to 0·2 Cc.**).

Contains 55 to 65% Cinnamic Aldehyde (*v.p.* 30) by volume. **U.S.** requires 80%. *For Analytical Data, see Vol. II.*

The light yellow oil distilled from the bark. The Chinese oil, as distinguished from that made in Ceylon, is known as Cassia Oil.

Leaf Oil ' is practically free from Cinnamic Aldehyde.

Soluble in alcohol 90% about 10 in 3.

Is occasionally prescribed as an inhalation (30 to 40 minims) with boiling water 1 pint. Cinnamon oil is used in influenza and catarrhs.

Stimulates the heart reflexly and directly dilates blood vessels, thus exerting valuable action on vaso-motor system. Action on bronchial tubes anti-spasmodic. Should be given in 20 minim doses in milk (or on sugar) for first three hours, every other hour 15 minims for two doses, then three or four hourly 10 minim doses. If patient can take to bed cure will be rapid.—L. ii./08,1661. (*See also* Oleum Eucalypti). Cinnamon oil relieves toothache.

In chronic deep seated sepsis such as internal venous thrombosis with pyrexia and other constitutional symptoms more general use of Essential Oils advocated. It is a good plan to vary the Oil, *e.g.*, 10 minims four times daily in capsules of Cinnamon one day, Cloves the next, Peppermint, and so on The antiseptics in this way saturate the system. Not on empty stomach.—H. French, Woolwich Medical Association.

Children exposed to infection by German Measles have been prevented from taking the disease by powdered Cinnamon—as much as will lie on a sixpence or shilling with their food night and morning. Should be tried in measles also as a prophylactic. Essence of Cinnamon in 25 drop dose one of the most effective remedies in cases of acute coryza.—W. B. Drummond B.M.J. i./17,765; ii./17,32.

Warts cured by application of the oil. Sir W. Cheyne found it effectual.—L. ii./15 672.

Capsules of Cinnamon Oil. $2\frac{1}{2}$ minims increased to 5 minims with **Quinine Sulphate** 1 grain have been used in typhoid.

Cinnamon Dental Paste. Iodoform made into a paste with Cinnamon Oil.

COAL TAR DERIVATIVES.

The Aromatic series of derivatives from coal tar, so freely used as antipyretics and analgesics, produce changes in the blood, diminishing its respiratory capacity and destroying red corpuscles if used in excess.

Fever is a salutary reaction. Antipyretics are a fallacy. Fever eliminates the germs that cause the disease. Directly the internal temperature rises, the infective agents, ill at ease in a medium the temperature of which no longer suits them, seek to escape, and are consequently found in the urine, saliva and all products of secretion. This is no doubt the reason why the organism applies itself with such energy to maintaining the fever, and this in spite of antipyretics. To give them is wrong. Note the serious effects not uncommonly following them—syncope, collapse and heart failure. The patient must perspire. Sudorific drinks and saline laxatives must be given; urinary secretion stimulated by Lactose, Urotropine and Theobromine; the liver by small doses of Calomel, pulmonary secretions by Ammonium Acetate.—Paul Blum, Med. Pres., July, 27/21, per P.J. ii./21,115.

***Liquor Carbonis Detergens.** (*Wright's*). (T.M. 7418 & 7419).

This alcoholic preparation owes its properties in part to Phenol. Is used as a Lotion, from 1 drachm to 1 ounce to a pint of distilled water forms a yellowish milky emulsion ; or, as an Ointment, Liquor Carbonis Detergens 1, Unguentum Hydrargyri Nitratis 3, Unguentum Simplex 4. In prurigo and chronic scaly skin diseases.

The following is also useful in eczema : Liquor Carbonis Detergens 2, Liquor Plumbi Subacetatis 2, Zinci Oxidum 4, Glycerinum 4, Aqua 36. *Vide also* **Wright's Coal Tar Soap.**

A *Coal Tar Inhaler and Vaporiser is made for treatment of whooping-cough, croup, bronchitis, influenza and like affections.

Balneum Picis Carbonis. St. John's H. **Balneum Bituminis,** L. H. Solution of Coal Tar 8 ounces, Water at 95° F. 30 gallons.

St. M.'s H. had Tar 3, Methylated Spirit 2, Ether 1. This lotion to be applied and allowed to dry, then followed with hot bath.

Lotio Plumbi Detergens, V.H.C. One drachm to a pint of water. Liquor Carbonis Detergens 1, Liquor Plumbi Subacetatis Fort. $2\frac{1}{2}$.

Unguentum Picis et Acidi Salicylici, V.H.C.

Liquor Carbonis Detergens 30 minims, Salicylic Acid 15 grains Ammoniated Mercury 5 grains, Soft Paraffin to 1 ounce.

Pruritus ani well treated by tar preparations.—B.M.J. ii./09,321. In psoriasis 1 in 8 of lanolin to be rubbed in.—L. i./09,968.

Liquor Picis Carbonis. *Off.*

A solution made by dissolving Prepared Coal Tar 2, in a 10% Tincture of Quillaia Bark 10 parts made with 90% Alcohol at 50° C. and filtering.

Lotio Picis Carbonis Alkalina. St. Th. H.—Liquor Picis Carbonis 1 drachm, Sodium Bicarbonate 120 grains, Water to 1 pint.

Lotio Picis Carbonis Aromatica.

Coal Tar 3 ounces, Ether 2 ounces, Spirit 1 ounce. Dissolve, filter and add Peruvian Balsam 6 drachms, Salicylic Acid $1\frac{1}{2}$ drachms.

Liquor Picis Ligni may be prepared by dissolving Wood Tar 1 in 20 of a Tincture of Quillaia 1 in 10 of Alcohol 90%.

One part to 7 or more is useful for skin affections. The tincture of quillaia enables Tar solutions to form emulsions with water.

Aqua Picis, Ph. Ned., 5%, by mixing with Pumice.

Alopecia areata treated by this preparation and occasional application of **Burt's Fluid** (a special preparation). Hair grew completely —P. S. Abraham, P.R.S.M. Derm. Sectn. Mar., 1910, p. 55.

Bitumen. A name given to various inflammable hydrocarbon mixtures, even colorless naphtha or rockoil of Sp. Gr. 0·7 to 0·8 but in this country we should associate it with Asphalt or of similar consistence. It is also given to the residue after distilling petroleum products. Liquor Bituminis, *Syn.* **Bitumarine** is an anticorrosive paint.

Acriflavine. *Syn.* **Diamino-Methyl-Acridine Chloride Hydrochloride.** $C_{14}H_{14}N_3$ Cl.HCl.=296·134. (Graphic in last Edn. p. 293).

The compound originally called **Trypaflavine** in Germany was initially called Flavine here, but the latter name was abandoned as it is applied to a vegetable dye. The substance is the subject of Casella's British Patent No. 24652 of 1910 (D.R.P. 243085) and is made under license by firms in this country.

The name Acriflavine was agreed to by the Board of Trade on the understanding that licensees of the patent should manufacture the compound under that name only.

Chemical Composition.

There appear confused statements in the literature as to the composition of this body. It is the Hydrochloride as indicated in the above formula and our analyses confirm the statement. In comparison with Euflavine which is a monochloride, Acriflavine may be viewed as a dichloride.

***Trypaflavine.** TRADE MARK (No. 327437, Class 1). Suspended under Temporary Rules Act, but renewed 1924. Permit was granted to two British firms to use.

Manufacture.—Details of the process are given by Benda (Ber. 45, p, 1787, *et seq.*) and in the patent specification. A survey of Benda's paper and the patent specification with some amplifications from Prof. Morgan, gives the following information :—

Aniline and Formaldehyde are combined to form anhydro-formaldehyde Aniline —polymeric form $[C_6H_5N : CH_2]_3$. This base is condensed with Aniline and Aniline Hydrochloride to *pp*^{1}—Diaminodiphenyl-Methane.

This DIAMINODIPHENYL-METHANE is dissolved in Sulphuric Acid and nitrated at not exceeding 5° C. and neutralised with Soda. The paste of the Dinitro-Diamino body is reduced with Tin and Hydrochloric Acid.

The TETRA-AMINODIPHENYL COMPOUND formed is heated as its tin double salt with HCl 4 hours at 135° C.

Ammonia is eliminated and a mixture of dihydrodiamino-Acridine and its oxidation product diamino Acridine is produced, both bases being as hydrochlorides (the Sulphate of the latter base is Proflavine). The oxidation is due to the presence of air in the Autoclave. It is completed with the aid of Ferric Chloride. The diamino acridine is now acetylated to the di-Acetyl derivative. This body, dissolved in a dry inert solvent is methylated in the acridine ring with either dimethyl Sulphate or methyl toluene-*p*-Sulphonate. The diacetyl product crystallises and is then hydrolised by boiling with Hydrochloric Acid when the Acetyl and the Sulphate or Sulphonate groups are removed and Acriflavine is obtained of the formula indicated.—*cf.* also details under Proflavine.

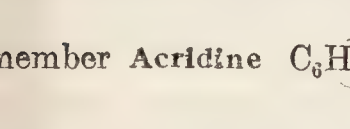
In the patent specification it is stated that, compared with its higher homologues, such as Acridine Yellow (which is 3 : 6 — diamino— 2 : 7 dimethyl-acridine Hydrochloride) this body has the advantage of being very soluble, and these hitherto "unknown salts of 3 : 6 Diamino—10 alkyl or aralkyl Acridine have proved specifics against trypanosomes."

It might be made by a method other than that of the patent.—See C.D., July 14/17, page 609.

Acridine Compounds—3 : 6 **Diamino-Acridine** preparation.—Poulenc Freres & R. Meyer, Pat. 137,214 Abst. J.C.S.A. i./20,252.

Properties.—The compound is in the form of a reddish brown crystalline powder.

The trypanocidal property depends greatly. Browning says, on the presence of the methyl group attached to the Nitrogen atom—this is implied, though not expressly stated, in Benda's work.

It may be added that the Acridine series of dyes have as initial member **Acridine**  They are formed by heating

Diphenylamine with fatty acids in presence of Zinc Chloride, *e.g.*

$(C_6H_5)_2NH + H.COOH = (C_6H_4)_2N-CH + 2H_2O$.

Solubility.—In water 1 in 5. Commercial samples we find vary considerably. In alcohol 1 in 40. In glycerin 1 in 4 or less. Insoluble in liquid paraffin, oleic acid, vaseline and eucalyptol—by experiment.—W. H. M., 1917. Concentrated aqueous solutions are brown, dilute ones lemon yellow with green fluorescence.

Compatible with Normal Saline if required for immediate use, but we observe a deposit after about 24 hours. Higher concentrations of Saline, *e.g.*, 5% throw out a precipitate almost at once.

Compatible with 0·5% Sodium Citrate.

Incompatible with Dakin's Solution, Eusol and other Chlorine Antiseptics. Also with Mercuric Chloride Solution (*e.g.* 1 in 1,000 as used), also with Phenol (*e.g.*, 1 in 20 solution)—by our experiments.

Solutions may be boiled or heated in an autoclave to 130° C.

To remove Acriflavine stains from the hands, etc.—Rub with a little dilute Hydrochloric Acid or with a little dilute Sulphurous Acid, or with Sulphurous Acid followed by Hydrochloric Acid, and then wash with water. Either of these procedures is effectual.

Internal use.—The substance has not been advised for internal use, but we are indebted to a correspondent (Dr. A. Houlgrave) for the following notes:—"I took two or three 1/8 grain doses of Acriflavine and noticed nothing definite, then I took three ¼ grain doses evening, morning and evening. The only effects noticed were that I perspired heavily on the night of the third dose."

Pills of Acriflavine 1/12 grain (0·005 Gm.) have been prepared.

Antiseptic Powers.—It possesses marked antiseptic and in particular trypanocidal powers, hence the name Trypaflavine.

It is specially active *in presence of serum.*

According to C. H. Browning and his co-workers, the ideal antiseptic must have a great potency in the presence of serum; it must stimulate granulating processes; it should not interfere with phagocytosis, and must not be irritating to the tissues. Bactericidal activity of many hitherto employed antiseptics is diminished when the media containing the bacteria are composed entirely or partly of serum. Acriflavine was found, amongst the series of bodies examined, to be the only one of high antiseptic power to maintain its action in presence of serum. The potency of Acriflavine, it is stated, is not merely unimpaired by blood proteins—it is enhanced by their presence.

The members of the group of Diamino-Acridine derivatives in the presence of serum are the most potent bacterial agents known and the property of being enhanced in this activity by serum is shared by no other type of chemical compound that has been investigated.

The closely allied substance Diamino-Acridine Sulphate (**Proflavine**) has similar properties, though it is not so active in curative properties in experimental trypanosome infections.

Intravenous injections into rabbits showed that this Acridine Sulphate compound will render the blood serum antiseptic or greatly augment its bactericidal power—this is still manifested several

hours after injection.—C. H. Browning and R. Gulbransen. Proc. Roy. Soc., B. Vol. 90, 1917, p. 140.

The list of bodies investigated includes Phenol, Iodine, Hypochlorites, Malachite Green, Mercuric Chloride, Crystal Violet and other dyes. Acriflavine has been found to be 20 times more powerful against *Staphylococcus aureus* than Mercuric Chloride and 800 times more so than Phenol or Chloramine-T in these conditions of testing.

With regard to the second point, the authors claim that most antiseptics are very inimical to phagocytosis, hence their action is a very mixed blessing. The higher the germicidal power in the presence of blood serum and the lower the hindering of phagocytosis the more useful is the antiseptic.

Acriflavine Solution 1 in 1,000 does not interfere with phagocytosis (For methods of estimating influence of antiseptics on leucocytes *in vitro* see Wright's Method and *in vivo.* C. J. Bond, B.M.J.ii./17,71.

The **Therapeutic Coefficient** ("T.C.") of Browning is the ratio between the highest concentration of the substance, which does not reduce the phagocytic count below half that of the control, to the weakest concentration of the body, which is sufficient to kill *Staphylococci* in the presence of serum. Acriflavine and Brilliant Green gave the highest ratios. Acriflavine is less irritating to conjunctival epithelium than Brilliant Green. Both stimulate granulation in wounds.

The "T.C." of Acriflavine is 200, *i.e.* it kills both *cocci* and *B. Coli* at a concentration of 1 : 100,000, whereas to affect phagocytosis a concentration greater than 1 : 500 is requisite.

T.C. of Mercuric Chloride is $\frac{10000}{7000} = 1{\cdot}4$; of Phenol $\frac{250}{500} = 0{\cdot}5$, and so on.

The germicidal value of Acriflavine on staphylococcus in Broth and in human serum and in pus was found lower than that given by Browning. Its action too is very slow, not less than 24 hours' contact being adopted by Browning for the experiments. Staphylococcus in pus is not killed by 1 in 1000 Solution. —R. T. Hewlett, L. ii./17,493,727.

Browning turns the table by replying that the view that a substance to possess therapeutic value as an antiseptic must rapidly kill organisms is a time-hallowed test—witness phenol and mercuric chloride which do not put an end to suppuration in an infected wound.—*ibid*—p. 622.

A. Fleming issued a strong criticism of use of Acriflavine maintaining that its use is "therapeutically unsound" and that there is nothing to specially recommend it for use to septic wounds. A concentration of 1 in 2000 he finds inhibits leucocytic emigration, that even 1 in 3200 strongly agglutinates human red corpuscles, that 1 in 500 solution is usually unable to sterilise an equal volume of pus from a wound in 24 hours, that 1 in 500 injected into the pleura or peritoneal cavities loses its antiseptic power in 2 hours.—L. ii./17,341 An equally powerful reply by C. H. Browning.—*ibid*, 437. A. Fleming's rejoinder.—*ibid*,508.

CHEMOTHERAPY OF PYOGENIC INFECTIONS WITH SPECIAL REFERENCE TO THE ANTISEPTIC PROPERTIES OF THE ACRIDINE COMPOUNDS. The flavines appear to be the most efficient antiseptics from the therapeutic standpoint so far investigated by the authors. *Staphylococcus aureus* and *B. Coli* used. Doses of 0·33 Gm. of Proflavine (Sulphate) in normal Saline have been given intravenously at a rate not exceeding 50 Cc. per minute (see also p. 316). There may be transient sickness and there is coloring of the skin which disappears.

'Fragments' of the Acridine Molecule were examined—these showed a low grade of antiseptic power—as also **Phenazine** Compounds.—C. H. Browning and J. B. Cohen, B.M.J. ii./21,695.

Strengths for Use.—Solutions of 1 in 1,000 in normal saline are recommended. This strength (= on the basis of bactericidal concentration to an 80% Phenol solution in the case of *Staphylococci*) is used to the surface of wounds without causing pain or local irritation.

The dye is advised for prompt use to wounds, soon after infliction, to prevent sepsis, by destruction of virulent organisms before they have had time to gain a foothold and to multiply extensively—*e.g.* for casualty work at hospitals, this solution may effect healing by first intention.

The muscles round the site of an infected wound may be injected with several ounces of 1 : 1,000 solution without ill effect.

Use in conjunction with Hypertonic Saline.—The 1 in 1,000 solution is not precipitated by adding Sodium Chloride up to 5% strength or by 0·5% Sodium Citrate.

Suppurating Wounds.—Acri- or Proflavine solution 1 in 1,000 is used to swab out the open wound once or twice a day *after free drainage has been secured.* All the crevices of the wound are to be reached and sloughs, etc., removed. Then lightly pack with gauze steeped in the solution and cover with a piece of "protective" to prevent evaporation. Several ounces of the solution may be safely left in the tissues or peritoneal cavity. In cases showing spreading inflammatory conditions, it is well to inject the antiseptic into the part and especially around the edges with a hypodermic serum syringe.

When the infection has been practically overcome weaker solutions, *e.g.*, 1 : 5,000 may be used or the treatment may be intermitted for a day every few days, dry dressing being substituted in the intervals, or "stimulating" applications, *e.g.*, Brilliant Green solution 1 in 1,000 may be employed.

Inlet tubes may be used, but frequent periodic flushing, *e.g.*, every two hours, with an aqueous solution (Carrel's method) is to be *avoided.*

One must recall that suitable concentration of serum is required to produce the full activity of these antiseptics. Brilliant Green in 1 in 2,000 solution is, however, much more powerful than these bodies in aqueous solution, but rapidly inactivated by serum ; this latter dye has given good results by Carrel's method.

Gauze steeped in the solution is specially favoured as the dressing need only be changed once or twice in 24 hours.

Prophylactic Use before onset of Suppuration.—A contaminated wound, within the first few hours of infliction, if thoroughly cleaned with 1 in 1,000 solution—as much as possible being left in the cavity—may be sewn up and will heal by first intention. The same result may be expected in war wounds if similar facilities are permitted, but the thoroughness conducted in civilian practice is not always possible in advanced positions in the field. On the whole the immediate suture of war wounds after cleansing with Acriflavine is not favoured. It is better to pack the wound with the soaked gauze for three or four days after requisite surgical procedure. Suppuration may thus be aborted in many cases, and the wound may be sewn up if there is no obvious contraindication. Inject the solution into the surrounding tissues and muscle planes with a syringe and fine needle as previously mentioned if there is extensive damage to the tissues.

The use of Acriflavine is also advocated at the time of secondary operations to prevent the recrudescence of sepsis when operating in an area already affected.

Intravenous Injection.—The preparation has been tried even to the amount of 300 Cc. of 1 in 1,000 solution without ill effect. The injection is given slowly—at the rate of 50 Cc. per minute. The method has not been largely practised.

Subcutaneous and **Intramuscular** injections of 5 to 10 Cc. of 1 in 1,000 solution have been given.

Emulsion of Acriflavine in Liquid Paraffin 1 to 1,000.

Thoroughly clean and sterilise with spirit a pestle and mortar of ample size. Place 0·1 Gm. Acriflavine in the mortar, thoroughly powder and dissolve in 1 Cc. of Alcohol 90%. The substance may not dissolve entirely. Samples vary, but at any rate the particles should be made into as fine a condition as possible.

Place 1 Gm. of White Wax B.P. in an enamelled saucepan, melt it carefully, and add 99 Cc. of Liquid Paraffin, and heat together to 110 or 120°C., then gradually add this mixture to the Acriflavine in the mortar with continual stirring. This produces an emulsion or suspension of 0·1% strength which is relatively permanent. Stronger or weaker dilutions may be prepared.—W. H. M.

Another formula.—Acriflavine 0·1, Thymol 0·005, White Wax 4, Liquid Paraffin 76, Water 20. Wounds and tuberculous glands well treated.—T. E. A. Stowell, B.M.J. i./19,244.

ACRIFLAVINE SOAP PASTE prepared by neutralising Stearic Acid 1 with Sodium Carbonate 1¾ and incorporating 0·1% Acriflavine, also a Starch Paste or Mucilage with 0·1%.— C. J. Bond, B.M.J. ii./17,6.

Literature on Acriflavine.

For the original paper advising the therapeutic use of this dye, see C. H. Browning, R. Gulbransen, E. L. Kennaway, and L. H. D. Thornton, B.M.J. i./17,73.

Report on 150 cases treated at Middlesex Hospital, about 50 per cent. being war wounds. Stimulus to early formation of granular tissue is a marked feature. Author states he has no hesitation in injecting Acriflavine into the tissues, and has never observed toxic action. Regards its use superior to any hitherto employed.—D. Ligat, B.M.J. i./17,78.

Acriflavine does not sterilise (bacteriologically) recent wounds. Various bacteria grow freely in wounds healed with it. It appears to cause a very superficial necrosis—a fibrinous membrane if used in strength of 1 in 1,000. In spite of presence of bacteria, there is a notable absence of inflammation and of septic infections. Healing by granulation is very slow—the growth of granulations is evidently checked by the presence of Flavine. It appears to be useful in form of gauze soaked in the solution when used as a first dressing to large open wounds and to limit the power for harm of pathogenic bacteria and to prevent inflammation of the tissues being caused by bacteria.—Sir Anthony Bowlby, L. ii./17,640. Wounds treated were within 4 to 12 hours of infliction. Solution 1 in 1,000 in Normal Saline but 1 in 5,000 for subsequent applications is enough. For Carrel's irrigation method 1 in 10,000. There was absence of all toxicity even in large wounds. The primary dressing need not be changed for two or three days.—H. Drummond and J. W. McNee, L. ii./17,640.

A simple Acriflavine packing subsequent to operative procedure enables the dangerous period of the first few days to be safely passed without the occurrence of gas gangrene or spreading pyogenic invasion of tissues. Reply to certain points in the last mentioned paper.—C. H. Browning and D. Ligat, L. ii./17,768.

Fifty cases treated. A 1 in 1,000 solution far from being innocuous produced deleterious effects on the entire process of healing, killing successive layers of the reacting tissue elements, including the essential vascular mechanism. A favourable feature, however, is that the patient is protected in some way from absorption of toxic products.—E. F. Bashford, J. N. J. Hartley and J. T. Morrison, B.M.J. ii./17,849.

Cases treated by the Carrel-Dakin method have been compared with Acriflavine cases in the last-mentioned paper—the C.-D. process is not of universal application on account of inherent difficulties in technique, but for ease of application, early cleaning of wounds, and abatement of reaction to absorption, the dye is admirable.—E. M. Pilcher and A. J. Hull, B.M.J. i./18,172.

Acriflavine is more potent than Proflavine. 1 in 4,000 thought efficient for a wound infected with *strepto.* or *staphylococci.*—W. Parry Morgan, L. i./18,256.

Threatened sepsis of knee joint aborted by injection of 30 Cc. of 1 in 1,000 Flavine.—W. H. Hillyer, L. i./18,103.

Extensive experience in relative value of this (gauze packs wrung out in 1 in 1,000 solution) to other antiseptics (the "old fashioned" plain sterile gauze, Cyanide gauze, Boracic Acid, etc.). Not an excellent dressing but *relatively* a bad one. A film or coagulum forms on the surface in every case —not easy to remove.—M. Pearson, B.M.J. i./18,271.

Sepsis can be prevented by the primary use of Flavine-soaked gauze. Formation of a yellowish pellicle in three or four days is a sign for change to Eusol or Brilliant Green or Magnesium Sulphate.—H. M. Savery, B.M.J. ii./18,283.

In influenza epidemic Acriflavine spray 1 in 1,000 seemed to have some preventive effect.—B.M.J. ii./18,111.

GONORRHŒA treated by lavage with 1 in 4,000 Acriflavine—one pint used twice daily.—D. Watson, B.M.J. i./19,571. See also H. E. Gibson, L. i./19, 741. Also by 1 in 1,000 Acriflavine with 2% Alkali.—J. Armstrong, B.M.J. ii./19,170. See also W. M. Browdy, Pr. Oct. 1921, and B.M.J. i./23,1080.

CONJUNCTIVITIS and gonorrhœal ophthalmia well treated by Flavine 1 in 4,000.—P. Ganguli, Pres., Feb./21,70.

Corneal wounds well treated.—C. Killick. per Pres. Feb./23,75.

Trypaflavine in aqueous and alcoholic Solution as dressing in DERMATOLOGY —sycosis barbæ, folliculitis and septic ulcers.—B.M.J.E. i./22,1.

Burns and pyogenic conditions well treated. No interference with granulation tissue.—C. Bennett, J.W.S. Blacklock and C. H. Browning, B.M.J. ii./22, 306.

Flavine-Starch poultices in the treatment of eczema. 4 tablespoonfuls of rice Starch and 10 grains (0·6 Gm.) of Acriflavine mixed with cold water; 1 pint of boiling water added, and the mixture boiled till it thickens. When nearly cold pour on to dressing cloth, to form a layer ½ inch thick. When cold and set, cover with a layer of gauze and apply to part. Change 3 or 4 times a day and bathe part at each change with Acriflavine 1 in 1,000 in 0·85% NaCl. Resistant cases of seborrhœic eczema successfully treated by this method.—Jl. Trop. Med., June 1/23,196.

In animal treatment, *e.g.*, throat canker and one eyed cold in pigeons, 1 in 200 solution used as swabbing, efficacious.—Pigeons and Pigeon World, July 16/1920.

Proflavine.—*Syn.* 3 : 6. – **Diamino acridine sulphate.**



H_2SO_4=516·438.

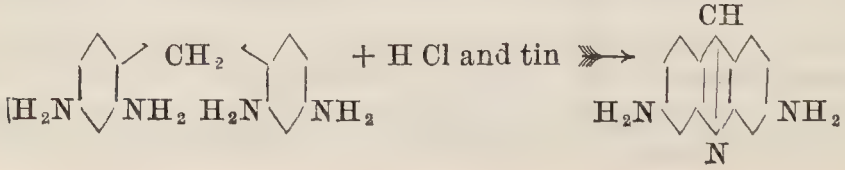
This aniline dye, it will be seen, precedes Acriflavine in manufacture by several steps—it is hence the cheaper of the two.

PATENT. The method of making is embodied in the Acriflavine Patents *q.v.* It is, however, also the subject of Casella's D.R.P. 230412 ("Maufacture of 3 : 6 Diamino-Acridine") British Patent 24652/1910.

This Brit. Patent covers the same ground as the two German Patents 230412 and 243085 (Acriflavine).

According to the description of procedure in Benda's paper (Ber. 1912, p. 1787) 250 Gm. Diamino Diphenyl Methane are added to 5 kilos Sulphuric Acid (66° Bé.). The temperature rises to 40° C. Cool to 0° C. and nitrate with 540 Gm. Nitrating Mixture (representing 160 Gm. Nitric Acid). Allow to stand for 2 to 3 hours. Add Ice 17 kilos and make alkaline with 7 kilos of Ammonia. Temperature not to rise higher than 45° C. Press off, wash with warm water and reduce by adding 2 litres Hydrochloric Acid Sp. Gr. 1·18 and warming to 50° C. and then adding Tin 450 Gm. The temperature rises to 110° C.

To effect closure of the ring the solution is now heated to 135° C. for 4 hours.



After cooling, the crystals are boiled with water 5 litres and treated with Ferric Chloride to oxidise any Hydro-Acridine that may be present. Now neutralise with Sodium Hydrate, boil again, draw off and wash the residue with boiling water.

From the combined filtrates a mixture of Diamino-Acridine and its HCl Salt crystallises out. This is converted into the Sulphate.

Chemical Note.—Though a diamine, this body as will be seen by the formula, functionates as a mono-acidic base. It is probably the N, rather than the amido groups which forms the Salt. Titration shows one molecule of H_2SO_4 to two of base.

(Samples of Proflavine of commerce which we have examined have been the HYDROCHLORIDE *of the formula $C_{13}H_{11}N_3.HCl$.* NOT *the sulphate.)*

It is in the form of a coarse brown powder. The concentrated aqueous solution is brown. It stains the skin yellow similar to Acriflavine. Dilute solution is also light yellow with fluorescence.

Solubility.—In water 1 in 140, in Alcohol 90% 1 in 48, in glycerin 1 in 10 or less, insoluble in liquid paraffin, oleic acid, vaseline and eucalyptol—(by our experiments, Aug. /17).

Compatible with Normal Saline Solution as distinct from Acriflavine (*q.v.*).

Antiseptic Powers.—This compound resembles Acriflavine in being strongly bactericidal for all the common pathogenic bacteria. Its power is likewise increased in the presence of serum. As weak a solution of Proflavine as 1 : 200,000, it is stated, will kill *staphylococcus aureus* in the presence of serum.

This compound and Acriflavine are comparatively little toxic for the body as a whole, and although Proflavine is slightly more inhibitory towards phagocytosis its general toxicity for mice as tested by subcutaneous injection and the irritating effect of concentrated solutions on the conjunctiva are markedly less than those of Acriflavine. They may be applied to the peritoneum with safety.—C. H. Browning and co-workers, B.M.J. ii./17,71.

Tablets.—1·75 grains each with sodium chloride. One dissolved in 4 ounces of sterile water produces a 1 in 1,000 solution in saline.

Proflavine Oleate 1% a proprietary ointment "made up with paraffin and calcium carbonate in about equal parts." For raw surface wounds.—B.M.J. i./19,152.

Lotio Proflavine (Pro Oculis) N.E.H.

Proflavine 1 grain in 10 ounces.

Uses.—Similar to those of Acriflavine, but it is stated to differ in that it exerts a degree of hæmostatic action.

Wounds treated with 1 in 1,000 solution. Primary sutures with excellent results. In one case out of 20 some stitches had to be removed. No difference between this and Acriflavine.—L. Colledge and co-workers.—L. ii./17,676.

Proflavine in 30 cases—disarticulations and amputations, compound fractures, wounds of joints and flesh wounds treated with 1 in 2000 solution in normal saline. Gauze packs for deep wounds after drainage and removal of foreign bodies. For open wounds folds of gauze used with solution added as required. The primary dressing removed on the third day. Wounds became clean in about 12 days. When the characteristic yellowish 'fibrinous membrane' for meda more stimulating antiseptic—Eusol—was indicated.—R. B. Carslaw and W. Templeton, L. i./18,634.

Euflavine. *Syn.* ACRIFLAVINE NEUTRAL, DIAMINO-METHYL-ACRIDINE CHLORIDE.

$C_{14}H_{14}N_3Cl + H_2O = 277{\cdot}682$.

This substance, being more basic than Acriflavine, is even less irritant to mucous tissues and more suited for use *intravenously.*

Uses and Dosage.—As for Acriflavine. Stronger solutions can be employed. For *local use* to wounds 1 in 1,000 to 1 in 500. For *bladder irrigation and urethral injection* 1 in 4,000 to 1 in 1,000. For skin infections 1% in Alcohol.

Intravenously 1 in 1,000 to 1 in 200 in lymphangitis, enlarged tuberculous glands and threatened sepsis.

Euflavine Tablets. 1 in 2 ounces make 1 in 1,000 solution.

Euflavine may be used in gonorrhœa, *cf.* W. M. Browdy, Pr. Oct. 1921.

Containing about 1·5% Sodium Chloride as stabiliser, it does not smart like Acriflavine.—P.J. i./23,85,564.

Puerperal septicæmia and pyæmia. 'Flavine' 1 : 1,000 in Saline intravenously as a routine. *Dose.*—10 to 15 Cc. One per diem, but in severe cases, 2 doses.—B. Whitehouse, B.M.J. ii./20, 267.

Aniline. *Syn.* MONO-PHENYLAMINE, ANILINE OIL. $C_6H_5NH_2 = 93{\cdot}094$.

A colorless (when freshly distilled) oily liquid, with Sp. Gr. 1·027. Of burning taste, soluble in alcohol and oils, slightly in water.

Antidotes.—Fresh air, emetics, alkaline salt (NaCl) solution, sodium sulphate, artificial respiration, oxygen, transfusion.

Tetryl. *Syn.* TETRA-NITRO-METHYL-ANILINE. An explosive; causes dermatitis amongst women workers. Severe cases treated by steaming with subsequent application of wet cloths. This reduces swelling and allays irritation. It stains the skin yellow. Calamine lotion used with success subsequently, or an ointment of Zinc Ointment, Castor Oil and Lanoline. Lead lotion to be avoided; Lead has a dangerous affinity for Tetryl.—B.M.J. i./16,618.

Note.—Claessen (Fr. Pat. 355695, 1905) proposed this body and the Ethyl analogue as detonating explosives. Will (U.S. Pat. 827768, 1906) uses the same compound mixed with mercury fulminate.—Thorpe, *Vol. II.*, p. 467.

Aniline-Iodoform.—Iodoform 1 in Aniline Oil 10 (by weight).

℞ ℙ **Aniline-Cocaine.**—Cocaine (base) 5 in Aniline Oil 100 (weight). These are employed in aural treatment.

Aniline Sulphate. $(C_6H_5NH_2)_2H_2SO_4 = 284{\cdot}264$. *Dose*—½ to 3 grains (**0·03 to 0·2 Gm.**).

Has been used for emphysema and asthma; must be used cautiously, as it may cause cyanosis.

Paraphenylenediamine. $C_6H_4(NH_2)_2 = 108{\cdot}114$

Prepared by nitrating Acetanilide and subsequent reduction with Tin and Hydrochloric Acid. In white or reddish crystals soluble in water, Alcohol and Chloroform.—M.pt. 140° C.

For use as hair dye, apply first a solution 2% with 1·5% Sodium Hydrate, then an oxidising agent, *e.g.*, 5% Ferric Chloride to give brown or 3% H_2O_2 to produce a black shade. May produce skin eruptions, eczema, etc, nausea or nervous symptoms, sleeplessness, dizziness, weakness, etc., or impairment of vision.—B.M.J. ii./09,812; P.J. ii./09,535. Should prohibit sale.—L. i./10,66.

Fur workers liable to be affected with traumatic dermatitis from this substance, as it is much used in dyeing.

The only cure when ladies are affected by skin eruptions from use of hair dye containing it is by shaving the head. It is cheaper than Silver Nitrate, hence probably reason of its use by hairdressers.—B.M J. ii./09,918.

A Patent Specification says the addition of Sodium Sulphite 1 to 1 renders it harmless.—P.J i./11,804, 823

Mrs. Potter's Walnut Juice Hair Dye is well known to contain Paraphenylenediamine as active ingredient. A case of acute catarrhal eczema of the face and scalp caused by it yielded to the use of Iodine Ointment reduced one third strength by Petrolatum —P.J. ii./12,301.

Though toxicity has been reduced by converting Paraphenylenediamine into Sulphate idiosyncrasies still occur. Tolylenediamine with Sodium Sulphite occur in 'Primal'—usually non-irritant —B.M.J.E., Apl. 24/1914

Paraphenylenediamine hair case. INECTO LTD., issue a warning on the subject of the use of Inecto, which contains Paraphenylenediamine and Resorcin, but this was not sufficient to protect them in the action—later warnings were more complete. Damages £200.—B.M.J. i./22,373.

The œdema of head, neck, tongue, eyelids and face is the first stage in general swelling, and it is suggested that it is due to a change in the composition of the blood.—O. S. Gibbs, Jl. Pharm. & Exp. Ther. per P.J. i./23,233.

Metaphenylene-diamine Hydrochloride. *Syn.* **Lentine.** $C_6H_4(NH_2)_2.HCl$. *Dose.*—$\frac{1}{6}$ grain once or several times daily. In acute diarrhœa. Adult dose $1\frac{1}{2}$ grain to 3 grains thrice daily. The urine becomes dark coloured. —Gehe, see also Brickdale.

This compound, traced in fur, considered more poisonous than the para-. The fur cut away from the leather yields nil to distilled water, but dilute saline, alkalis, acids and wool fat (if digested some hours), extracted a coloured principle which agreed with metaphenylene-diamine.—H. Skinner quoted by H. C. Semon, B.M.J. i./23,613.

Materials used in dyeing furs are Amino-derivatives of Benzene, Naphthalene, etc. Others are Benzene-derivatives containing Amino- and Oxy-groups. Paraphenylene-diamine is known as 'URSOL.' In its oxidation Chinondichlordi-imine, which is very irritating, is formed. Pyrogallol, and a number of other dyes are used to produce different shades.—B.M.J. i./23,535.

Dermatitis from dyed fur. "Dyed coney" is probably rabbit—probably paraphenylenediamine employed.—H. C. Semon, B.M.J. i./23,467.

METOL poisoning due to the presence of the Methyl derivative of Paraphenylenediamine. Victims of poisoning by phenylenediamines are warned against the use of soap which aggravates the dermatitis. Acetic Acid 50% is advocated as a detergent, and for the relief of the itching bathing the parts in cold water is recommended.—Brit. Jl. Photog., April 13/23,218, per P.J. i./23,386.

Orthotoluidine.—$C_6H_4CH_3NH_2 = 107{\cdot}115$

A colourless liquid turning brown on exposure to air and light and otherwise closely resembling Aniline. Sp. Gr 1·0037, B.pt. 199° C. *Soluble* 1 in about 70 of water.

Does not appear to have been used therapeutically.

Acidum Sulphanilicum. $C_6H_4NH_2SO_3H$, $2H_2O$ (1 : 4) = 209·188.

Dose.—5 to 10 grains **(0·3 to 0·6 Gm.).**

In small white crystals, slightly soluble in water. Used in Ehrlich's Diazo Test, now deleted from this work. Iodism has been treated by 15 grain doses daily of the Acid in 7 ounces of water.

It is analgesic, and is best given as—

Sodii Sulphanilas. $C_6H_4NH_2SO_3Na$, $2H_2O = 231{\cdot}178$.

Dose.—5 to 15 grains **(0·3 to 1·0 Gm.).**

In white shining scales, easily soluble in water. Useful in acute catarrh, laryngitis, and otitis. Said to convert the harmful nitrites in saliva and nasal mucus into innocuous diazo bodies.

Ferri Sulphanilas. $(C_6H_4.NH_2.SO_3)_3Fe = 572{\cdot}278$.

Iron Sulphanilate was introduced under the name ✱**Ferrivine** (T.M. 371090) or "IRON TRI-*p*-AMINO-BENZENE SULPHONATE."

It is not now used medicinally to any extent.

Zinci Sulphanilas. *Syn.* ✱NIZIN. (T.M. 287163).

$(C_6H_4NH_2.SO_3)_2Zn. = 409{\cdot}662$.

White crystals soluble 1 in 7 water, 1 in 250 Alcohol 90% (by our experiments). Solutions 1 in 500 to 1 in 250 are injected in the acute stage of gonorrhœa. In atrophic rhinitis the nasal fosæ may be packed with gauze dipped in 1 to 2% solution.

Anthrarobin. $C_6H_4C(OH)CH.C_6H_2(OH)_2=226{\cdot}15$.

A light brownish powder, darkening with age, obtained from alizarin by reduction. A powerful deoxidising agent, soluble in weak alkaline solutions. 10% ointment in psoriasis, etc.

Benzol. Fr. Cx.—'Benzine.' (Avoid this way of spelling for this body.—W.H.M.) *Syn.* Benzene (*Off.*). $C_6H_6=78{\cdot}078$.

Dose.—5 to 10 minims (**0·3 to 0·6 Cc.**), in capsule or oily solution.

A mixture of homologous hydrocarbons obtained from light coal tar oil. Sp. Gr. 0·880 to 0·887.

Antidotes.—See Poisons and Antidotes.

When swallowed it usually produces a sensation of burning in the stomach. It is a narcotic which, when swallowed or inhaled, produces vertigo, delirium and tonic convulsions, followed by deep sleep; 30 Cc. has proved fatal.

Uses.—For cough, and whooping-cough, and in influenza. It quickly destroys pediculi capitis or pubis, applied freely; one application sufficient.—For seborrhœa, should be brushed on the skin.

It has also been somewhat extensively tried in leukæmia.

It has preservative action on organic matter, *e.g.*, 2 drops preserved ounces of Infusion of Gentian several days in an open vessel.

This body is entirely distinct from **Petroleum Benzine** or **Benzoline,** obtained in the fractionation of the hydrocarbons in Shale. Petroleum Ether and Petroleum Benzine are used for heating cauteries for nævi, &c.

Benzol is not suitable for this purpose—it burns with a smoky flame. It is, however, better for removing grease stains.

A test for it is to drop into a sample a few grains of Dragon's Blood. If the genuine article it is at once coloured; if it be the Petroleum article scarcely any effect.

Michael Faraday discovered the body in the liquid of coal gas cylinders (as then used) calling it Bicarburet of Hydrogen $C_{12}H_6$. It was renamed Benzole by him and Benzine by the French (who still adhere to the term—*vide* Fr. Cx.). Benzole would be the best name for this body (' ol ' being retained for Alcohols) Benzine, or better Benzin, being kept for the petroleum distillate.

Benzol Capsules contain 5, 10 and 15 minims diluted with ½ volume of Olive Oil, also **Benzol ' Formagules '** same strength.

Leukæmia has been treated by large doses, *e.g.*, 3 to 4 Gm. (45 to 60 minims approx.)

A case of spleno-medullary leukæmia treated with doses ranging from 30 to 90 minims daily markedly improved. White cells dropped from 133,000 to 7,100 with corresponding increase in red from 2,400,000 to 4,175,000 also increase in Hæmoglobin from 40% to 75%. Nodular lympathic leukæmia treated with similar results but terminated fatally, likewise a case of lymphosarcoma. The question arises as to whether the improvement is permanent.—T. G. Moorhead, B.M.J. i./15,410.

A number of similar accounts have appeared. It would be well to treat cases with small doses at first and to note toleration or otherwise. Simultaneously blood counts.

We know of a case of lymphatic leukæmia which has been markedly improved by 15 m. Capsules with Olive Oil. Leucocyte count markedly reduced in a fortnight. As much as 2 drachms *per diem* of Benzol were taken.

Experiments on animals have shown that chemically pure Benzol is distinctly more poisonous than the crude variety in use in the rubber industry. —P.J. i./23,324.

National Association's Specification for Motors. Sp. Gr. 0·885. Sulphur not exceeding 0·4%. Distillation tests.—B.M.J. i./19,251.

Benzoyl Chloride. $C_6H_5.COCl = 140·535$. Mix Phosphorus Pentachloride 50 parts with Benzoic Acid 28 parts in an open pan in the fume chamber. When reaction ceases, distil. The first fraction coming over between 107° C. and 190° C. consists principally of Phosphorus Oxychloride, the Benzoyl Chloride distilling between 190° C. and 200° C. Sp. Gr. 1·218. Yield about 20 parts. Distinguish from **Monochlorbenzene** (*Syn.* **Benzol Chloride**), $C_6H_5Cl = 112·53$, Sp. Gr. 1·106, B.pt. 132° C., and **Benzyl Chloride** $C_6H_5CH_2Cl = 126·551$, Sp. Gr. 1·106, B.pt. 178° C.; also **Benzal Chloride,** *Syn.* **Benzylidene Chloride** or **Benzyl Dichloride,** $C_6H_5CHCl_2 = 161·003$, Sp. Gr 1·288, B.pt. 206° C.

Benzyl and **Benzylidene Chloride** and homologues and substitution compounds, Patent 134,250, see J.C.S.A. i./20,21.

Para-dichlor-benzene ($C_6H_4Cl_2 = 146·982$) 92%, Soap 3%, Paraffin Wax 3%, Cedar Wood Oil 2%, for wood beetle killing. Used in Westminster Hall.—From the "Times."

Nitrobenzol $C_6H_5NO_2 = 123·078$, "Oil of Mirbane," has an odour similar to Benzaldehyde, and is used in cheap perfumery; it is a dangerous poison if used in sweetmeats.

Copper sulphate given as emetic; further treatment: Calomel and Bismuth. Recovery.—L. i./06,1242. Fatal dose is about 1 Gm. Boot blacking caused poisoning.—L. ii./04,1439. Poisoning by—placed on cotton wool for toothache. Recovery under 0·2 Gm. Caffeine hypodermically.—B.M.J. i./12,183.

Antidote.—Strychnine hypodermically and stimulants.

Nitrobenzol can be reduced electrolytically to **Azoxybenzol** $C_6H_5N:O:NC_6H_5 = 218·156$; **Azobenzol** $C_6H_5N:N.C_6H_5 = 192·156$; **Hydrazobenzol,** $C_6H_5NH.NHC_6H_5 = 194·172$; and Aniline, $C_6H_5NH_2 = 93·094$. Preferable to chemical means.—P.J. i/16,3.

Dinitrobenzol, $C_6H_4(NO_2)_2 = 168·078$. The meta compound is formed by treating Benzol with a mixture of fuming Nitric Acid one vol. and Concentrated Sulphuric Acid one vol., and has melting point 90° C. The *ortho-* body has melting point 117° C. *Para-*, 172° C.

Trinitrobenzol. $C_6H_3(NO_2)_3(1:3:5) = 213·078$. Crystalline leaflets melting at 121° C.

Manufacture.—Heat *Meta*-dinitrobenzol 60 with fuming sulphuric acid 1,000 and Nitric Acid (Sp. Gr. 1·52) 500, for a day at 100° C. and for 4 days at 110° C. The yield depends a good deal on the length of heating and other conditions. We found this method (Beilstein Erg. 3 Aufl. ii. p. 49) to work better than that given in Watts. The Trinitro body is separated by pouring this reaction mixture into water (5 or 6 vols.).

Benzyl Alcohol. $C_6H_5.CH_2.OH = 168·124$.

Dose.—5 to 40 minims (**0·3** to **2·5 Cc.**) in water three or four times a day.

A liquid with a slight aromatic odour.

Is a satisfactory local anæsthetic, preferably used mixed with Chloroform. A few drops applied to exposed nerve or cavity is an efficient anodyne for toothache. It is 40 times less toxic than Cocaine.—Chem. News, Feb. 25th, 1921.

In common with the other Benzyl derivatives this parent Alcohol has been found by Macht to be useful in excessive intestinal peristalsis, pylorospasm, and conditions of the nature of persistent hiccough, as also in whooping-cough. It is stated that the addition of 1% to 5% of Benzaldehyde improves efficacy.—C. & D. Nov. 1920,1629.

Benzyl Benzoate. *Syn.* ***Spasmodin** (T.M. 398016). (*Spasmodine is T.M. 403738). $C_6H_5CO.O.C_7H_7 = 212.156$.

Dose.—10 to 30 minims (**0·6 to 2 Cc.**) of 1 in 5 Alcoholic Solution in water or as *emulsion, vide* below.

A liquid with aromatic odour, Sp. Gr. 1·1 as occurring in commerce.

The pure substance is in white crystals melting at 20° C. (Fluid at 19° C.). The preparation of commerce is physiologically pure, but cannot be guaranteed 100%—the difference would be Benzyl Alcohol.

Manufacture.—From Benzyl Alcohol and Benzoyl Chloride (Kraut, Ann. 152,130). Also by heating Benzaldehyde at 100° several days with a small quantity of Sodium Benzylate.

The following has been stated to give a yield of 70 to 75% of theory :—

A mixture of finely powdered, desiccated sodium benzoate and a slight excess of benzyl chloride is heated on an oil bath at 170° to 175° for about 24 hours, the mass being frequently stirred. The mixture is allowed to cool, whereupon it is first shaken up with water and then sufficient sodium carbonate added to produce an alkaline reaction. The benzyl benzoate, which separates as an oily liquid, is removed by decantation and distilled *in vacuo* to remove the excess of benzyl chloride. After rectification the pure product boils at 196°, at a pressure of 25 mm.—C. D., Mar. 31/23, p. 438.

It was found that Papaverine, which is probably a Tetra-methoxy-benzyl Isoquinoline, had the effect of inhibiting contractions of the ureters and lowering the tonus of plain muscle whilst the Pyridine Phenanthrene group represented by Morphine was found to stimulate contraction and increase tonicity. Benzyl esters were therefore examined and found to act on smooth muscle of the viscera in a similar way to the first mentioned alkaloid—the benzoate being finally selected for use.

Uses.—It is practically non-toxic and has been used in excessive intestinal peristalsis, diarrhœas and dysentery, intestinal biliary and renal colic, spastic constipation, vesical spasm, uterine colic, arterial spasm and bronchial spasm of true asthma. Might be of service in dysmenorrhœa.

Capsules of Benzyl Benzoate contain 3 and 5 minims (**0·2** and **0·3 Cc.**).

Emulsion of Benzyl Benzoate.

Dose.—½ to 2 drachms (**2 to 8 Cc.**) every two hours as required.

Benzyl Benzoate 1, Mucilage of Acacia 15, Aromatic Elixir to 40.

We have slightly modified the formula from that in our last Edition. This new formula gives a more permanent emulsion.

Whooping Cough is well treated by Benzyl Benzoate.—D. Macht, L. ii./20,615, but its action is uncertain.—L. i./21,394.

In spastic constipation should be given intramuscularly, *e.g.*, diluted with Olive Oil. Adult dose 20 minims. For children *pro rata* by Young's table.—L. i./21,394.

Persistent Hiccough. Highly spoken of. Twenty to 30 drops of the 20% Alcohol Solution, in milk or water.—L. ii./20,512.

Lymphatic Leukæmia has been treated with it. It is harmless in comparison with Benzol. *Dose.*—5 drops *t.d.*—Pres. Nov. '19.

Benzyl Acetate. $CH_3CO.O.C_7H_7 = 150{\cdot}125$.
Oily fluid smelling of pears, made from Benzyl Alcohol, Acetic Acid and Sulphuric Acid or by boiling Benzyl Chloride with Alcoholic Potassium Acetate. Formed also by boiling a mixture of Benzoic Aldehyde and Glacial Acetic Acid with zinc dust.—(Watts.).

Benzyl Acetyl Salicylate $C_6H_4O.CH_3CO.COO.C_7H_7 = 270{\cdot}192$ appeared to be the most powerful intestinal relaxant of twelve Benzyl Esters tested. They all produced relaxation of the intestinal muscles, lowered blood pressure and depressed respiration similarly to Benzyl Benzoate.—Nielsen and Higgins, Jl. Lab. and Clin. Med. St. Louis, Nov. 1921, per P.J. i./22,47.

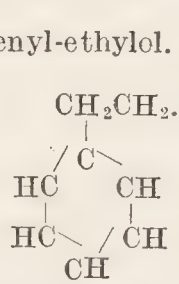
Benzyl Succinate. *Syn.* ✱Spasmine (T.M. 421401) $C_{18}H_{18}O_4 = 298{\cdot}234$. *Dose.*—5 to 15 grains (**0·3 to 1 Gm.**).
This is a tasteless crystalline substance. Not nauseating to the stomach. It is employed for conditions similar to those for which the Benzoate has been given. **Esterol-Stearns** is a special brand.

Capsules of Benzyl Succinate 5 grains with **Papaverine Sulphate** ½ grain are prepared for the combined effect of these bodies.

Benzyl Mandelate $C_7H_6OH.COO.C_7H_7 = 242{\cdot}182$, prepared by the action of Benzyl Chloride on Sodium Mandelate, has been shown to have antispasmodic properties, similar to Benzyl Benzoate. This substance melts at about 93° C., and is nearly insoluble in cold water, but readily soluble in Alcohol, Ether, Chloroform and Benzol.—D. Bau, P.J. i./23,265.

Cinnoxyl Capsules are stated to contain **Benzyl Cinnamate** $C_9H_7O_2.C_7H_7 = 238{\cdot}192$, and Cholesterin.

Benzylcarbinol, *Syn.* *B*-phenyl-ethylol. **'Rose Oil'** or **'Orange Oil.'**
A local anæsthetic



thought to be superior to Benzyl Alcohol. Toxicity about the same as that of the latter. It is sufficiently soluble for therapeutic use.—A. M. Hjort & J. T. Eagan, Jl. Pharm. & Exp. Therap., Nov., 1919.

Toluol (Methyl-Benzol) $C_6H_5CH_3 = 92{\cdot}099$ and **Xylol (Dimethyl-Benzol)** $C_6H_4CH_3CH_3 = 106{\cdot}12$ have chemical and physical properties allied to Benzol. The 1 : 2 Xylol boils at 141°, 1 : 3 Xylol boils at 139°, 1 : 4 Xylol boils at 138°.

Xylol. *Syn.* **Xylene,** unless otherwise specified, is a mixture of the three modifications. In *dose* of 5 to 15 minims in capsule rendered less likely to dissolve in the stomach juice than in the intestines; has been employed in respiratory affections and in dyspepsia, and has also been suggested for use in certain skin diseases.
A small quantity of Toluol added to a fresh vegetable infusion has a remarkable preservative action as Benzol above. As **solvent naphtha,** a

mixture of toluol and xylol—obtained in distilling coal-tar—is used on a commercial scale as a solvent for indiarubber. Agitation for days of the finely comminuted material with the solvent is needed. (Solvent Naphtha commercially may now be of much higher B. pt. *cf.* Mineral Naphtha.).

Scarlet Colors.

Some confusion seems to exist as to the **Scarlets**:—

Biebrich Scarlet, according to Schultz & Julius (Systematic Survey of Organic Coloring Matters 1908) is the Sodium salt of Sulphobenzene-azo-sulphobenzene-azo-Betanaphthol, soluble in water giving an orange-red solution.

"Scarlet R." is the Sodium salt of Xylol-azo-Betanaphthomonosulphonic acid, also water soluble.

Bordeaux Bx is the Sodium salt of Xylol-azo-Xylol-azo-Betanaphthol-Beta-monosulphonic Acid: soluble in water.

Toluol-Azo-Toluol-Azo Betanaphthol. *Syn.* **Fett Ponceau R.** is insoluble in water, but soluble in spirit and in Chloroform and in fats.

The last mentioned was relatively unobtainable during the war and has been replaced by:—

Benzol-azo-Benzol-azo-Betanaphthol, *Syn.* **Cerasine Red.** It is also insoluble in water, moderately in Alcohol and very soluble in Chloroform and Ether (by our experiments). This body is generally suitable for medicinal purposes.

Uses.—To regenerate skin and to hasten epitheliation. As ointment 2 to 8% Scarlet has been much employed.

Aurinaria of Scarlet 5% strength are prepared for aural treatment.

Unguentum Scarlet 2 to 8 %, or as required in Unguentum Lanolini.

Old ulcers markedly improve. The ointment should not be left on more than 48 hours, or marked irritation may occur In corneal ulcers favourably reported on.—Pres. Jan. 1911, p. 4.

Ulcers, 80 cases. In the majority it was given for intertrigo of the ear, or of the napkin area, and seemed to improve in even 24 hours.—L. ii./11,1043

Should not be used on fresh wounds, and in granulating wounds only a thin layer of ointment should be applied on the edges.—H. M. Lyle, Med. Rev. Nov. 16/12, per Pres. Feb. 1913.

In rodent ulcer 2% Scarlet Ointment efficacious after Carbon Dioxide and removal of the eye —Pres. Nov. 1912,299.

In traumatic corneal abrasions and corneal ulcers a 1% ointment with vaseline or Vaseline and Lanolin equal parts successful. For granulating postaural wounds in acute mastoid disease a 2 to 4% ointment on gauze or lint with good results.—F. Allan on Value of Scarlet Ther. Gaz., Jan. 1913, p. 1.

Headache, giddiness, intense epigastric pain and vomiting following use of Scarlet Ointment (8%). 6% found satisfactory.—L. ii./12,1678.

Action of Scarlet upon 'X' rayed skin. In old 'X' rayed skin (2 to 15 months previously) of the rabbit's ear the injection of a solution of Scarlet Red is followed by epithelial proliferation which may reach an extreme degree provided the destructive effect of the 'X' radiation has not been excessive. A marked tendency to sloughing is seen when the dye is injected into old 'X' rayed tissues,—the tendency being greater the more marked the extent to which the appendages of the skin have been destroyed.—J. O. W. Barratt, L. i /13,454.

Biebrich Scarlet 5, Hard Paraffin 12·5, Soft Paraffin 82·5 suggested. The basis should be of consistence that the ointment will just come away cleanly with the dressing and yet not too hard for perfect contact.—P.J. i./17,268.

As a contrast stain in histology after use of Hæmatoxylin or Methylene Blue to define nuclei of cells. 1% aqueous solution of Biebrich Scarlet for 2 to 5 minutes is useful. Does not overstain or discharge colour of the nuclei. —A. K. Gordon, B.M.J. i./17,828.

Non-Staining Scarlet. Amido-Azo-Toluol is used similarly.

"T.N.T." Tri-nitro-Toluene, *Syn.* **Trotyl,** $C_6H_2CH_3(NO_2)_3$= 227·099. *See Vol. II.*

Trinitro-Butyl-Toluene $C_6HCH_3C_4H_9(NO_2)_3$ is synthetic Musk or Tonquinol.

Chinolinum. *Syn.* Quinoline C_9H_7N=129·109

Dose.—3 to 10 minims **(0·2 to 0·6 Cc.).**

A colourless liquid, with peculiar odour, soluble in alcohol, but insoluble in water. Prepared by oxidising a mixture of Aniline and Glycerin with Nitrobenzol.

Chinolini Tartras.

$(C_9H_7N)_3,[C_2H_2(OH)_2(COOH)_2]_4$=987·559.

Dose.—5 to 15 grains **(0·3 to 1 Gm.)** in chloroform water, with Syrup of Orange, or in cachet.

Glistening, white acicular crystals, nauseous in taste, and ***soluble*** about 1 in 80 of water. Antiseptic and antipyretic, *e.g.*, in enteric and intermittent fevers, useful in neuralgia.

Oxyquinoline Sulphate. *Syn.* **Superol,** $(C_9H_6N.OH)_2.H_2SO_4$=388·294.

✱**Chinosol.** *Dose.*—1 to 5 grains **(0·06 to 0·3 Gm.).**

TRADE MARKS: CHINOSOL Nos. 220003 (Class 1: No claim for "Chino"), 221896 (Class 2), and 221898 (Class 48), registered in 1899. Registrations renewed in 1912 and 1913.

PATENT: No. 1409 of 1896, "An Improved Manufacture of an Antiseptic Disinfectant," granted to the owners of the trade mark. The patent ***expired*** in 1909.—Per C. D., Aug. 1915.

The above patent deals with the 'heating of oxyquinoline with Potassium Pyrosulphate.'

The substance was originally stated to be Potassium-oxyquinoline Sulphate but the content of Potassium in the original article of Commerce does not agree with theory.

Characters and Uses.—Yellow crystalline powder, M. pt. 175 to 177° C. readily *soluble* in water, sparingly in alcohol. A 2% solution checks surface hæmorrhage and for scalds. 1 in 1,000 for the hands. In chronic eczema 1 in 200 combined with Lotio Calaminæ Oleosa.

Tablets 5, 8 and 15 grains. One of the latter in a pint of water is said to be equal to Phenol 1 in 40, as an antiseptic. **Gauze,** 3% 6yd. pieces.

For notes on Manufacture see last Edn. p. 306.

Tolysin. *Dose.*—2 Gm. every 2 hours for 3 doses, followed by 1 Gm. every 4 hours.

Stated to be an ethyl ester of Paramethylphenolcinchonic Acid. In acute rheumatic fever.—C. W. Chapman, Pr. Jan.'24, 41.

Cyanine Dyes, Sensitol Red, Violet and **Green, etc.,** used as Photographic sensitizers, are extraordinarily active against staphylococci. **Sensitol Green** an iso-cyanine is made by condensing quinoline methyl iodide with *p*-tolu-quinaldine methiodide.—C. H. Browning and co-workers. B.M.J. i./22, 514,612.

Cyanine. *Syn.* QUINOLINE BLUE, IODOCYANINE is usually given the composition $C_{29}H_{35}N_2I$ or $C_{28}H_{35}N_2I$.

Styryl-quinoline Derivatives formed by condensation in presence of piperidine of *p*-dimethylamino-benzaldehyde and quaternary salts of Quinaldine and Lepidine. Substances of this group are powerful antiseptics. —C. H. Browning and co-workers, B.M.J. ii./23,326.

Acidum Phenylcinchoninicum, U.S. *Syn.* ✱**Phenoquin,** (T.M. 403738), ✱ATOPHAN (T.M. 331473), CINCHOPHEN. $C_6H_5.C_9H_5N.COOH$.

PATENT 15,684/12, "Improved process for Manufacture." There are others to which reference should be made, *e.g.*, 12,053/12.

Dose.—30 to 45 grains (**2 to 3 Gm.**), daily for 3 or 4 days.

Tablets 4 grains (0·25 Gm.) eight to twelve daily; 8 grains 0·5 Gm.) four to six daily.

A yellowish cream-coloured amorphous powder of the composition 2-Phenylchinolin 4-Carbonic Acid. Is said to facilitate the elimination of uric acid from the organism in gout and rheumatic affections.—L. ii./11,1143 also used in neuralgia and sciatica.

Incompatible with Sodium Bicarbonate and other alkalies *in vitro*. We did not find it incompatible with Potassium Iodide.

It is advised to give Sodium Bicarbonate, 225 grains (15 Gm.) the first day and 75 to 150 grains (5—10 Gm.) the following days, in addition to the atophan, to avoid setting uric acid free in the urine.

Increased excretion of Uric Acid confirmed. Four cases of gout and one of albuminuria treated, the uric acid in urine rose and that of the blood sank. The increased output is due to elimination of accumulated uric acid in the blood, due to kidney inefficiency.—Folin and Lyman, Jl. Ph. & Exp. Ther. 1913,4,539—546), ex J.C.S.A. i./14,115.

In two gouty cases the drug was thought to be much less active with regard to elimination of Uric Acid than in healthy subjects. It had hardly any action in doses of 1 to 2 Gm. Its action is little understood—it probably consists in decomposition of a larger quantity of Nucleoproteids or in some alteration in those fermentative processes which regulate the oxidation of the purin bases.—L. i./15,1092.

With Aspirin given in influenza the combined effect in inducing perspiration said to be better.—See Aspirin.

Toxic effects from Atophan. General malaise, headaches, gastro-intestinal disturbance, urticaria, albuminuria and jaundice, the latter did not clear for several weeks.—C. Worster-Drought, B.M.J. i./23,148.

✱**Neo-Phenoquin.** (T.M. 403739). Lithium Phenyl-cinchoninate. $C_6H_5C_9H_5N.COOLi = 255{\cdot}108$.

Dose.—From 5 to 15 tablets daily, each tablet containing 0·25 Gm. after meals and followed by a glass of water.

Simultaneous use of Sodium Bicarbonate is sometimes desirable.

Uses.—For elimination of Uric Acid, in acute and chronic gout.

✱**Griserin.** *Syn.* LORETIN, ✱YATREN. (T.M 417770). *Dose*—5 to 8 grains (0·3 to 0·5 Gm.). A preparation of Iodo-oxy-quinoline-Sulphonic Acid. Internal bactericide. Amœbic dysentery treated with 1 Gm. *t.d.* also by lavage with 200 Cc. of 5%.—Jl. Trop. Med. Aug. 15/23,267.

Fuchsine.—**Rosaniline Mono-Hydrochloride** (principally).

$$\begin{matrix} H_2N.CH_2.C_6H_3 \\ H_2N\ C_6H_4 \end{matrix} > C = C_6H_4 = NH_2\,Cl.$$

Syn. MAGENTA; ANILINE RED, RUBINE, HARMALIN.

Dose.—$\frac{1}{2}$ to 4 grains (**0·03 to 0·25 Gm.**), in a pill.

Iridescent crystals, forming a deep-red solution for staining *B. tuberculosis.*—*Vide* Clinical and Bacteriological Notes.—*Vol. II.*

Soluble in alcohol 1 in 8

Given in renal albuminuria. Must be arsenic-free.

Unguentum Fuchsin 5% in Soft Paraffin. Carbuncle and soft chancre well treated.—L. i./14,1502.

Rosaniline (*Syn.* **Roseine**) **Acetate.**

$C_{20}H_{19}N_3.\ C_2H_4O_2+5H_2O=451{\cdot}398$.

Dark red crystals ***soluble*** in water and in alcohol. Both these bodies are sometimes called 'Roseine.'

Methyl Violet. *Syn.* **Pyoktanin.** In green crystalline powder, *soluble* 1 in 20 of water, 1 in20 of alcohol 90%, also in Glycerin 1 in 15, and in

Oleic Acid. Insoluble in Liquid Paraffin and Vaseline—by our experiments. A mixture of the hydrochlorides of penta and hexa methyl-para-rosanilines, $C_{19}H_{12}(CH_3)_5N_3.HCl = 393{\cdot}828$ and $C_{19}H_{11}(CH_3)_6N_3.HCl = 407{\cdot}849$. Dilute solutions have been locally injected and applied for malignant growths. A yellow variety of Pyoktanin, an **Auramine**, $C_{17}H_{21}N_3HCl = 303{\cdot}745$. *Soluble* 1 in 80 of water and 1 in 105 of Alcohol 90%. **Gentian Violet** is also a trade name of Methyl Violet.

See also under Brilliant Green.

SELECTIVE ACTION OF COAL TAR DYES. As a general rule dyes with any marked action contain one or more *amido groups*. If it has a colloidal state in solution it is not likely to be a strong antiseptic. Experiments on *paramœcia* forms. **Auramine** and **Nile Blue** were very effective in strength—1 in 20,000 against trypanosomes—killed in 15 minutes.—F. H. Fairbrother and A. Renshaw, B.M.J. i.23,314,265; L.i./23,314.

Malachite Green. *Syn.* **Benzaldehyde Green.**

Characters.—This is chemically either the Zinc double chloride or oxalate of Tetra-methyl-di-para-amido-Triphenyl-carbinol: $(C_{23}H_{25}N_2Cl)_3 + 2ZnCl_2 + 2H_2O$ or $(C_{23}H_{24}N_2)_2(C_2H_2O_4)_3$.

The former is in brass yellow prismatic crystals while the oxalate is in green metallic glistening plates (Schultz & Julius).

Solubility.—The Zinc Double Salt by our experiments is soluble in water 1 in 20, very soluble in Alcohol, in Oleic Acid 1 in 14 (?) in Glycerin 1 in 7 (?), totally insoluble in Liquid Paraffin, Vaseline and Eucalyptol. The Oxalate is also soluble in water and Alcohol.

Uses.—During the war has been much employed as an antiseptic wound dressing—especially as spray.

Stains on the hands with Malachite Green are easily removed by rubbing with a little cotton wool soaked in either Alcohol or dilute Hydrochloric Acid or dilute Acetic Acid.

Cheatle's "Green Spray," *Syn.* **Sublimate Malachite Green Solution** composed of equal parts of 2% Malachite Green in 80% Alcohol and 2% Mercuric Chloride in 80% Alcohol (the two solutions are best kept separate and mixed as required)—proved satisfactory at Haslar.—W. G. Axford and G. L. Cheatle, B.M.J. i./17,535. The spraying must be thorough and the spirit allowed to evaporate before applying the dressing. *It must not be used to mucous membranes.*

Malachite Green kills *Staphylococcus Aureus* in serum in a dilution of 1 in 2,000, while it kills *B. subtilis* spores in a dilution of 1 in 5,000. Its effect is more marked in the case of Gram+ bacteria, the commonest flora of war wounds. When mixed with Mercuric Chloride it does not diminish the effect of the latter.—L. ii./15,165. Valuable routine results from Malachite Green in naval hospitals.—Med. Res. Committee, B.M.J. i./17,769.

Brilliant Green. *Syn.* TETRA - ETHYL - DIAMIDO - TRIPHENYL - CARBINOL in form of either Sulphate or Zinc Double Chloride (discovered 1879). For therapeutic purposes the *Sulphate* $C_{27}H_{34}N_2O_4S.$ is to be used.

Characters.—Golden yellow crystals, *soluble* in water and in Normal Saline and in Alcohol, forming a green solution.

Chemical Examination.—Samples on the market which we have examined were mostly the zinc double salt and probably much of the dye that is sold as Brilliant Green is in reality Malachite Green, the latter being in the form of Oxalate.

Fuse with fusion mixture to liberate zinc if present, before employing usual tests.

Antiseptic Power.—C. H. Browning and his co-workers in their work on the use of Acriflavine (*q.v.*) found this substance to compare very favourably with Acriflavine in antiseptic properties though the latter is more rapid in action.

Uses.—The dye was much used initially on their recommendation as a substitute for the yellow dye, and is still much used, solutions of strength 1 in 1,000 being employed. As a dressing it is painless. These two dyes had the highest "T.C." (*v.*p. 315). Brilliant Green differs, however, in that it is not advised to be introduced by injection into closed spaces.

Brilliant Green is almost as strongly bactericidal as Hexamethyl-Violet for *Staphylococcus aureus*, *B. diphtheriæ* or *B. anthracis* (a concentration of 1 in 5 million completely inhibited growth of these organisms on agar, whereas 1 in 250,000 of Mercuric Chloride was required for similar result). Hexamethyl-Violet, however, is so weak in its action on the coli-typhoid group as to render it of little value as an antiseptic against these organisms; whereas Brilliant Green is extremely potent in its action on the coli-typhoid group. Further, even in the presence of serum, Brilliant Green is very actively antiseptic. It is also highly inhibitory towards anaerobes, such as B. malignant œdema.—Browning & Gilmour, Jl. Path. and Bact. (Cambridge), Vol. xviii., p. 144.

The most powerful antiseptic investigated by a standard method using *Streptococcus fœcalis*.—Emery for Med. Res. Com., L. i./16,817; i./17,159.

Brilliant Green and Crystal Violet (Hexa or Penta-Methyl Violet or a mixture of these), 1% each in a mixture of rectified spirit and water equal parts used to sterilise the skin.—V. Bonney and C. H. Browning, B.M.J. i./18,562.

Stains on the skin can be removed with spirit, those on clothes by spirit or washing with soap.

Brilliant Green Ointment. Brilliant Green 1 or 2% in twice the amount of Alcohol 90% and incorporated with Soft Paraffin.

Epithelial stimulant in various minor injuries and affections, *e.g.*, impetigo, indolent ulcers of various kinds, superficial shell wounds involving only the skin, blisters, etc. Apply on a piece of lint the exact size of the part. Results remarkably good.—R. W. Hodgson-Jones, B.M.J. i./17,455.

Brilliant Green Paste (Hey's). Brilliant Green 1, Boric Acid 275, French Chalk 25, Liquid Paraffin 200. The Green is incorporated, dissolved in a little spirit. For filling wound cavities. —Wilson H. Hey, B.M.J. ii./17,445.

References.

Painless, non-poisonous, sterilises a wound in three days, needs dressing only about once in four days. Applied similarly to B.I.P.P. —A. Rendle Short, J. S. Arkle and C. King.—B.M.J. ii./17,506.

Wounds treated with 1 in 1,000 Normal Saline. Its use encourages formation of a moderate amount of "laudable pus." Results striking but not marvellous.—A. Leitch, B.M.J. i./16,236.

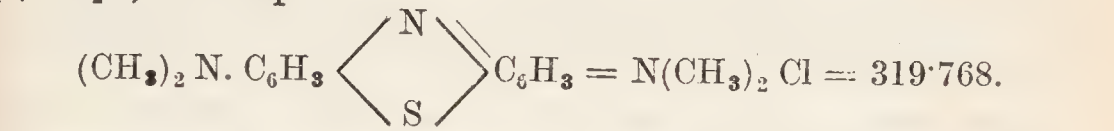
May be used with the salt pack and can be used by the **Carrel Method** of repeated irrigation for which Flavine bodies are not suited.—C. H. S. Webb, B.M.J. i./17,870 ; ii./17,74.

Gunshot wounds well treated by 1 in 1,000 to 1 in 500 Brilliant Green Solution in Normal Saline, also 1 in 500 in 0·5% Chloretone. The last mentioned preferred. Produces exuberant but very vascular bright red granulations. Used with advantage where anatomical conditions render primary excision impossible.—R. Massie, L. i./18,635.

Cholera Vibrio is particularly susceptible to Brilliant Green, Suggested use in man. Dogs tolerate 1/5th grain *per os.*—L. Nicholls, L. ii./17,563.

Methyl Green is **Chlor-Methyl-hexamethyl-*p*-rosaniline Hydrochloride.** *Syn.* LIGHT GREEN.

Methylene Blue, Medicinal.—*Syn.* METHYLTHIONINÆ HYDROCHLORIDUM. U.S. METHYLENUM COERULEUM, P. Helv., FR. CX. ($+3H_2O$). P. Jap. IV.



Dose.—1 to 4 grains (**0·06 to 0·25 Gm.**) in Pill, Cachet or Capsule ; or hypodermically, 1 grain. Stipule No. 4 holds 1 grain.

Dull dark green crystals, forming an intense blue solution in water. *Soluble* 1 in 50 —FR. CX. 1 in 20.

Incompatible with caustic alkalis.

Distinguish from the Commercial Compound with Zinc. Vide Vol. II.

Toxic effects of Methylene Blue possibly due to presence of Zinc Chloride. Presence of the latter sets up vesical and rectal irritation in malaria cases.—D. G. Marshall, L. i./17,276. We agree that metallic impurity of this kind is most undesirable.—W. H. M.

(**Night Blue** (*cf.* McCrorie's stains Vol. II.) and **Patent Blue A** are more suitable for colouring Perchloride Solution.—C. D.)

Uses.—Has been recommended as an analgesic, of service in rheumatism and painful nervous affections ; also in malaria, ague, nephritis, and retinitis. *Colours urine blue, and fæces become blue on exposure to air.*

Chlorinated Soda Solution, will remove stains caused by it.

In cystitis, a 2 grain capsule should be given and the bladder washed out with 2% solution. In dysentery a rectal injection 1 in 5,000. In chronic suppurative otitis media and conjunctivitis —1 in 500 solution warm is instilled. In intertriginous eczemas, 3 to 5% solution. It has been used in bilharziosis.

In gonorrhœa, Hare suggests capsules of 2 grains, oil of sandal wood 3 minims, oleo-resin of copaiba 3 grains, oil of cinnamon 1 minim.

In ulcerative colitis irrigation with methylene blue, 2 to 3 grains in 1 pint has been tried.—B.M.J. i./09,770.

In Blackwater fever œdema appeared lessened by its use.

For Methylene Blue and other Tests of the Kidneys, see Vol. II.

Purulent discharge (due to *Staphyloccocus aureus*) from the eye

socket well treated by 0·1% Methylene Blue solution.—H. M. McIlroy, B.M.J. i./19,405.

MALARIA treated by Methylene Blue—experience of 5,000 three grain doses. Though inferior to Quinine in cutting short attacks it is valuable in preventing relapses. No fear of 'toxic' symptoms.—D. G. Marshall, L. i./20,1334.

ACTINOMYCOSIS. Methylene Blue in 2 grain doses thrice daily, increased to 5 grains has been used. Nausea, dizziness and weakness were evidenced at first but soon disappeared. A 3% solution was injected locally but abandoned on account of pain. X rays alone or in combination with drugs should be sufficient.—Jl. A.M.A. Nov. 27/1920, p. 1470, per Pres. Feb. '21, p. 34.

Soudan Red III. AMINOAZOBENZENE-AZO-BETANAPHTHOL.

$C_{22}H_{16},N_4O.=352·27$. A brown dye for colouring fats, and in histology.

Chrysoidine.—DIAMIDOAZOBENZENE HYDROCHLORIDE.

$C_6H_5N_2C_6H_3(NH_2)_2HCl.=248·656$. An orange dye slightly soluble in water.

***Kephaldol** (T.M. *See* 366512, 367064, 367065, 367066, 367067). *Dose.*—30 grains (**2 Gm.**). A proprietary said to be made from Phenetidin, Salicylic and Citric Acids. Antipyretic, stated to be free from evil after-effects.

Stated to contain Phenacetin 50%, Sodium Salicylate 32%, Quinine 4%, Citric Acid 5%. Other analyses have stated Salicylic Acid 3% only and 'some sodium.'

Phenacetinum. *Syn.* **Acetphenetidinum** (*Off.*), **U.S.** FR. CX. **P. Austr.** $C_2H_5O.C_6H_4.NH.COCH_3$ 1 : 4=179·162.

Dose.—5 to 15 grains (**0·3 to 1 Gm.**), in cachets, tablets (Slipule No. 1 holds 5 grains), or suspended in mucilaginous fluids. **P.G.V.** max. single dose 15 grains. Max. during 24 hours 45 grains. approx.

An acetyl compound of Phenetidin, $C_6H_4(NH_2)\,OC_2H_5=137·136$ (the ethylic ether of paraminophenol). It is analogous to acetanilide (antifebrin). White, shining, laminar crystals, M. pt. 135° C., tasteless, ***soluble*** sparingly in water, 1 in 21 of alcohol (90%), and in sulphuric acid without colour.

Manufacture, Notes on.—*See Vol. II.*

Does not liquefy with sodium salicylate, but phenazone does, *e.g.*, Phenacetin 10 grains, Caffeine Citrate, 2 grains, Sodium Salicylate 5 grains, are not incompatible.

Phenacetin acts slower, but more enduringly than Phenazone. It is oxidised in the tissues and is excreted as sulphate and glycuronate compounds of acetyl-paramidophenol.—Gordon Sharpe.

This and other anilides, *e.g.*, Acetanilide are only slowly hydrolised in the organism with liberation of the parent basis—hence their activity.—O. C. M. Davis, B.M.J. ii./22,11.

Uses.—Reduces temperature and soothes pain, very rarely causes rash or cyanosis. Successful in rheumatism, neuralgia, migraine, and hysteria. In first stage of influenza relieves headache and mitigates aching of limbs. Doses of 4 to 8 grains reduce temperature in cases of pyrexia, but effects are only of short duration.

Useful to control pains in tabes dorsalis.—L. i./10,355.

Toxic Effects. *See Vol. II.*

Effervescent Phenacetin. *Dose.*—1 drachm (**4.0 Gm.**) or more.

In two strengths, 5 and 10 grains in 1 drachm respectively.

Tablets 4, 5 and 10 grains. Also 4 grains with **Caffeine** 1 grain, also 2½ grains with **Sulphonal** 2½ grains. *Dose.*—1 or more.

Phenacetinum cum Caffeina Effervescens.

Dose.—1 to 2 drachms.

Contains 5% Phenacetin and 2½% Caffeine Citrate.

Phenocoll Hydrochloridum, Hydrochloride of Amido-acet-para-phenetidin, a derivative of Phenacetin.

TRADE MARK: The word Phenocoll alone is not registered. T.M. 157131 (1891) is a device embodying the word which was renewed in 1919. PATENT 5269/1891 ***expired*** 1903.

$$C_6H_4\begin{cases} O.C_2H_5 \\ NH(C_2H_2O)NH_2 \end{cases} HCl. = 230{\cdot}646.$$

Dose.—8 to 15 grains (**0·5 to 1 Gm.**).

Manufacture.—By the action of Ammonia on Bromo-phenacetin.

A white crystalline powder with sharp saline taste. ***Soluble*** about 1 in 16 of water.

Combined with piperazin in effervescent form (*q.v.*) is specific in rheumatoid arthritis. Also beneficial in neuralgia arising from sudden cold. Also for headaches and pertussis (½ grain hourly). Successful in malaria; as a prophylactic.

Phenazonum. *Syns.* ANALGÉSINE, ANTIPYRINUM, DIMETHYL OXY-QUINIZINE, PHENYLDIMETHYL-ISO-PYRAZOLONE.

Note.—TRADE MARKS: ✱"Dr. Knorr's Antipyrine" was Registered by a firm, No. 42855/1885, renewed 1898 and 1913. The same firm registered (208865/1898) a label bearing the word Phenazon and device of 3 stars—'the essential particular being the device of three stars.' Renewed 1911.

PATENT: 3097/1884 to the same firm remained in force 14 years now ***expired.***

$$(CH_3)N.C(CH_3) : CH.\ CO.\ N(C_6H_5) = 188{\cdot}168.$$

Dose.—5 to 15 grains (**0·3 to 1 Gm.**) in cachets, tablets, or solution. Slipule No. 1 holds 5 grains; No. 0 holds 10 grains. **U.S.** *Average dose.*—5 grains.

Manufacture.—Condensation of Phenylhydrazine and Aceto-Acetic-Ethyl Ester followed by methylation.—C.D. ii./14, p. 273.

In white crystalline bitterish scales or powder. Gives a deep red colour with solution of ferric chloride, nearly discharged by diluted sulphuric acid.

Soluble 1 in 1¼ of water, about 1 in 1 of alcohol and chloroform, and 1 in 40 of ether.

Flavoring.—Glyl Menthæ Piperitæ, Glyl Rosæ, Syl Vanillæ; Aqua Menthæ Piperitæ, Syrupus Limonis, Syrupus Aurantii.

Given as an enema if contra-indicated by the mouth.

Uses.—It is an analgesic, reduces the temperature of fevers, and the pyrexia of pneumonia, pleurisy, phthisis, and erysipelas. In doses of 4 to 15 grains it relieves locomotor ataxy, chorea, migraine, facial neuralgia, rheumatism, and sea-sickness. Hypodermically for lumbago, sciatica, angina pectoris, biliary and renal colic, and dysmenorrhœa. A skin rash has at times been observed after its use, and in the past some poisonous effects were reported. Solution applied locally is hæmostatic.

Antidotes.—Administer brandy or ether, atropine, strychnine or oxygen. Warmth to the feet and body.

Antipyrin was used by Lieut. Clark in the murder of Mr. Fulham in India—the amount given being 4 drachms. This appears to be the first time the drug has been used for murder.—P.J. i./13,325,349.

Phenazone acts quickly, but its effects soon pass off. It acts partly as phenazone and partly as oxyphenazone, and is excreted as such. Interesting details *re* discovery and early uses. In 1884 Guttman used it to reduce the temperature of enteric, pneumonia and pleurisy with such success that the Germans believed they had found a panacea for reducing temperature, and by this means also for "curing" all conditions associated with fever. They boasted of conducting such fevers at normal temperature by continuous dosage of the new drug. Antipyretics became an obsession like the possession of Paris or Calais at a later date.—Gordon Sharp, P.J. ii./15,198.

Poisonous effects from 10 grains. Recovery under Strychnine and Brandy.—L. ii./10,101.

Incompatible with spirit of nitrous ether, or other nitrites in the presence of free acid, an apparently inert bluish-green iso-nitroso-antipyrine being formed; also with the cinchona alkaloids, forming a precipitate which is soluble in weak acids.

Further, with phenol, tannic acid, iodine, or mercuric chloride (precipitates); amyl nitrite, ammonia alum, hydrochloric acid, ferric chloride, ferrous and ferric sulphates, cupric sulphate, or nitrous acid cause discolourations; with calomel, as a highly toxic product may result; sodium bicarbonate decomposes it with production of an odour resembling acetic ether; orthoform produces a pasty mass. In general it is best to administer antipyrin alone.

Calomel and Antipyrin are incompatible. Reaction does not occur in presence of water or acid media such as gastric juice but in the presence of alkali changes occur which cause marked toxicity. Chemical compounds discussed.—J.C.S.A. i./20,94.

Liquefactions occur on rubbing it with butyl-chloral hydrate or sodium salicylate, but solutions with the latter keep without perceptible change if dilute. Liquefaction also occurs on mixing with β-naphthol.

In sciatica the following relieves the painful symptoms:—Phenazone 6 grains, Phenacetin 3 grains, Exalgin 1½ grains, Potassium Sulphate 1½ grains, Dover's Powder (*sine Ipecacuanha*) 3 grains. To be given in a cachet three or four times in the 24 hours. Good effects are also obtained from the following:—Phenazone 5 grains, Phenacetin 5 grains, Opium Powder ⅙ grain, in a cachet; 3 to 6 of which can be taken each day.

Effervescent Antipyrin contains 5, 10 or 15 grains in a drachm. *Dose.*—One teaspoonful or more.

Injectio Antipyrin Hypodermica.—1 grain contained in 2 minims. *Dose.*—8 to 30 minims (**0·5 to 2 Cc.**). **Sterules, Hypodermic** contain 4 grains (**0·25 Gm.**). The pain it causes may be lessened by the addition of cocaine, as in—

℞ **Injectio Antipyrin et Cocainæ Hypodermica,** containing 1 grain of Cocaine Hydrochloride in 150 minims of above. *Dose.*—8 to 30 minims (*vide* also Liquor Cocainæ et Antipyrin).

[D] [P1] **Tubache's Method** of treating sciatica.
Dose.—1 Cc. injected along the course of the nerve of a Solution of Phenazone 1 drachm, Cocaine Hydrochloride 1 grain, Sterile Water 1 drachm. Some 8 to 10 injections at intervals of 3 or 4 days. Pain after each lasts 6 hours. Sometimes Morphine necessary.

[D] [P1] **Sterules, Hypodermic** contain 4 grains of Antipyrin with Cocaine Hydrochloride $\frac{1}{20}$ grain. The latter may be increased.

Tablets of Antipyrin contain $2\frac{1}{2}$ and 5 grains each. *Dose.*—1 to 4 or more. Also 3 grains and **Caffeine** 1 grain.

Mistura Phenazoni Expectorans, St. Th. H.
Dose.—1 to 2 drachms (**4 to 8 Cc.**).
Phenazone 1 grain, Potassium Iodide $\frac{1}{2}$ grain, Ammonium Carbonate $\frac{1}{2}$ grain, Ipecacuanha Wine 3 minims, Syrup $\frac{1}{2}$ drachm, Dill Water to 1 drachm.

Local hæmorrhage of hæmophilia has been treated by application of a strong solution of Antipyrin in Ferric Chloride.

Pommade Reclus. Phenazone 5, Salol 3, Boric Acid 3, Iodoform 1, Phenol 1, Mercuric Chloride 0·1, Vaseline to 200. The formula is often modified—it may be diluted or made much stronger. For burns 1 or 2% Orthoform may be added.

∗**Acetopyrin** (T.M. 233820).—*Syn.* ANTIPYRIN ACETO-SALICYLAS.

$$C_6H_4{<}\begin{matrix}O.CH_3CO\\COOH\end{matrix}.C_6H_5.N{<}\begin{matrix}CO....CH\\N(CH_3).\ddot{C}.CH_3\end{matrix}=368{\cdot}276.$$

Dose.—8 to 15 grains (**0·5 to 1 Gm.**).

A white crystalline powder, ***soluble*** 1 in 160 water, but about 1 in $3\frac{1}{2}$ of Alcohol 90%. Analgesic, antipyretic, and anti-arthritic, used in sciatica, hemicrania, influenza, etc.

Ferropyrin. $Fe_2Cl_63(C_{11}H_{12}N_2O)=888{\cdot}941$.
Dose.—3 to 8 grains (**0·2 to 0·5 Gm.**).
TRADE MARK, none; PATENT, voided.

A *soluble* orange-coloured powder. Given for chlorosis and anæmia. It is hæmostatic and locally astringent, applied pure or 20% aqueous solution; and in gonorrhœa, injections 1%. *Incompatible* with salicylic acid.

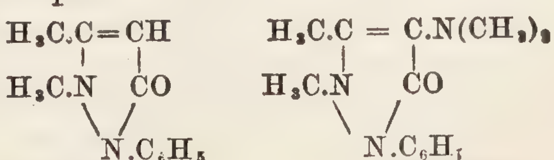
Amidopyrin. ∗**Pyramidon.** Dimethyl-Amido-Antipyrinum. **P. Jap.** *Syn.* DIMETHYL-AMINO-ANTIPYRINE. Ph. Ital., FR. CX.,

$$C_6H_5N.{<}\begin{matrix}CO\ ......\ C.N(CH_3)_2\\ \quad\quad\quad\quad\| \\N\ (CH_3).C.CH_3\end{matrix}=(231{\cdot}225).$$

Dose.—5 to 8 grains (**0·3 to 0·5 Gm.**). Slipule No. 00 holds 5 grains. FR. CX. has max. single 15 grains; max. during 24 hours 45 grains approx.

TRADE MARK: 215952, also 360918. PATENTS: 7709/1896 and 9268/1897 (now ***expired***). U.S. Patent 579,412 (1897).

Manufacture. — The following indicates the position of the Dimethyl-Amido group:



Antipyrin. Pyramidon.

Nitrosoantipyrin is first prepared by adding Potassium or Sodium Nitrite to a concentrated solution of Antipyrin in dilute Acetic Acid. This compound is reduced with Zinc Dust and Acetic Acid in Alcoholic solution to Amidoantipyrin. The latter compound forms yellow needles melting at 109° C. This amido body is then methylated by means of Methyl Iodide in Methyl Alcoholic solution in the presence of Caustic Potash. Another method—last Edn., p. 316.

A white powder M.pt. 108° C., ***Soluble*** about 1 in 9 of water and 1 in 2 of alcohol 90%. Incompatible with Amyl Nitrite, Apomorphine and Gum Acacia.

Uses.—Antipyretic ; similar to phenazone, but effective in smaller doses ; of special effect in sciatica. A **Camphorate** (*dose*—8 to 12 grains), **Bicamphorate** and **Neutral Camphorate.** PATENT 22,391/1900, (***became void***), (*dose*—12 to 15 grains), and SALICYLATE (PATENT 11,040 of 1900, now ***lapsed***) (*dose*—8 to 12 grains) are also prepared.

The camphorates are antipyretic, and have been advocated to suppress the sweats in phthisis, but why combine the antipyretic with camphoric acid—an active antisudorific ? The salicylate is given in rheumatic affections. ✱**Trigemin** (T.M. 256068/1903. PATENT 15,782/1903, lapsed 1909), (*Dose*—12 grains) is a butyl-chloral hydrate compound made by combining the constituents in molecular proportions (193·4 of Butyl Chloral Hydrate and 231 of Amidopyrin) on the water bath. We find this method works quite satisfactorily. After cooling recrystallise from Benzene. Is not a hypnotic ; for neuralgia, and sciatica.

In fibrositis 6 grain doses enhance utility of Aceto Salicylic-Acid (10 grains) in relieving pain.—A. P. Luff, B.M.J. i./13,756.

Antipyrinum Salicylicum, P. Austr., P. Belg., Fr. Cx., P. Helv., P. Jap. *Syn.*—**Salipyrin, Pyrazolonum Phenyl-dimethylicum-Salicylicum.**

$C_{11}H_{12}N_2O.C_6H_4(OH)(COOH)=326·25$. *Dose.*—15 to 30 grains (**1 to 2 Gm.**). Max. single dose 2 Gm., *pro die* 6 Gm.

Manufacture.—This is one of the easiest "synthetics" to prepare. Obviously all that is necessary is to combine the basic and acidic components in molecular proportions. Warm on a water bath Antipyrin 188 with Salicylic Acid 138. They liquefy and on resolidifying may be recrystallised from Alcohol. It crystallises in beautiful plates.

The process in the Patent Specification 10432/1890 which was in force for 12 years states that Phenylhydrazin, Aceto-acetic Ether, Methyl Salicylic Ether, Hydriodic Acid and Methyl Alcohol have to be heated together under pressure at 160—180° C. (!)

A white crystalline powder, with sweetish taste, sparingly *soluble* in water ; incompatible with acids, alkalis, and nitrites.

Useful in acute rheumatic fever, and in chronic rheumatism, and sciatica ; also for influenza and any acute catarrh and for menorrhagia ; as antipyretic in dose double that of antipyrine.

Tablets contain 5 grains (0·3 **Gm.**).

Amidopyrin Aceto-Salicylate. $C_{13}H_{17}ON_3.C_6H_4.OCH_3.CO.COOH$ =411·334.

Dose.—5 to 10 grains (**0·3 to 0·6 Gm.**).

A crystalline powder, soluble 1 in 13. It should be kept *dry* or is liable to decompose. Useful in headache and neuralgic pains.

ℙ **Amidopyrin diethyl-barbiturate, Dimethylaminophenyldimethylpyrazolon Di-ethylbarbiturate.** *Syn.* ✱ ℙ VERAMON (T.M. 418411). $C_{34}H_{46}N_8O_5$=646·602.

Dose.—Adult 2 to 3 tablets; children ½ to 1½ tablets.

A combination of Amidopyrin and Veronal for use as analgesic in headache, migraine, neuralgia and other forms of pain.

COCÆ FOLIA.

ℙ "*Coca, any preparation or admixture of, containing* 0·1 *or more per cent. of Coca alkaloids.*

𝔇 *Cocaine and Ecgonine and their respective salts, preparations and substances containing not less than one-tenth per cent.* (*one part in* 1000) *of cocaine or ecgonine.*

See also Dangerous Drugs Acts.

History of Coca. The plant originally named "Khoka" meaning "the tree of trees" first became known in Europe through the writings of Garcilaso Inca de la Vega, a student of Peruvian history, who died in 1616. Joseph de Jussieu in 1750 was the first to send specimens of the plant to Europe.—P.J. i./09,28; L. i./09,485.

𝔇 ℙ **Cocæ Folia** (B.P. '98). *Syn.* CUCA.

Dose.—½ to 2 drachms (**2 to 8 Gm.**).

The dried leaves of Erythroxylum Coca (*Off.*) and its varieties (*Linaceæ*) FR. CX. Two varieties are met with, North Peruvian or Truxillo variety, *Erythroxylon Coca* var. *novo-granatense* (Morris) of a pale green colour, small and thin, and the Huanuco or Bolivian variety, *E. bolivianum* (Burck), thought to be a distinct species, which are larger, broader, and thicker, and better therapeutically; of a dull olive colour. The characteristic inner curved lines from base to apex are on this more marked.

The leaves contain the crystalline alkaloid Cocaine, *q.v.* A content of 0·5% of this base has been suggested as a standard. For 𝔇 purposes 0·1% of cocaine or ecgonine brings the leaves within the meaning of the Act. They are said to be most active when freshly dried, and are much used by the natives in Bolivia and Peru, miners, travellers, and others. Much of the Coca coming in now is cultivated in Ceylon. *For details of assay by the author and others vide Vol. II.*

COCA LEAF CHEWING IN BOLIVIA. To the Indian there are two things for the attainment of which all else is only the means—coca and alcohol. The Indian of the Puna (highlands) chews coca incessantly, in addition to a small bit of lejia—a grey substance like a bit of tailor's chalk, composed of boiled potatoes ground into a paste with wood ash, dried and made into little flat cakes. This enhances the flavour and effect (it liberates the alkaloids). Some peons use as much as two pounds of dried leaf per week.—From 'Six Years in Bolivia' by A. V. L. Guise (T. Fisher Unwin), quoted, P.J. i./23,55.

Ⓟ **Coca-Chewing Gum** is prepared containing in each piece (weighing 45 grains) 2 grains of extract(=about $\frac{1}{25}$ grain of Coca Alkaloids).

Ⓟ **Elixir Cocæ.**—6 parts are equivalent to 1 of the leaves.

Dose.—1 to 4 drachms (**4 to 15 Cc.**) in water is a palatable preparation. Standardised to 0·075% Coca Alkaloids.

℞ ℙ1 **Extractum Cocæ.**

Dose.—2 to 15 grains (**0·12 to 1 Gm.**), in pills or pastils. A 'solid' or powdered extract. Made with alcohol 60% standardised to 2% Coca Alkaloids (1=about 4 of leaves).

℞ ℙ1 **Extractum Cocæ Liquidum** (B.P. '98).

Dose.—½ to 1 drachm (**2 to 4 Cc.**). 1=1 of leaves exhausted with 60% alcohol. It therefore contains approx. 0·5% Coca alkaloids. (45 or even 30% alcohol would make it more miscible.)

A single emergency dose of Extractum Cocæ Liquidum (1 in 1), said to act 'like a charm' in cases of *hæmorrhage due to piles*, when patient has to stand for any length of time.—C. E. Shelley, Pr., Sept., '23/211.

If freed from wax, it is miscible with water and more palatable, ***Flavoring.***—Syl Vanillæ, Glyl Coriandri; Elixir Saccharin.

℞ ℙ1 **Fluidextractum Cocæ, U.S.** *Dose.*—30 minims. Standard 0·5 Gm. ether-soluble alkaloids in 100 Cc.

Ⓟ **Infusum Cocæ.**—1 in 50 of boiling water.

Is a refreshing beverage with a slice of lemon.

℞ ℙ1 **Pastillus Cocæ Extracti.**—2½ grains (**0·15 Gm.**) of the extract in each. Each contains 1/20 grain Cocaine (0·25%). *Dose.*—One every two or three hours.

For loss of voice due to weakness or relaxation of the vocal cords.

℞ ℙ1 **Vinum Cocæ.**

Dose.—¼ to ½ ounce (**8 to 15 Cc.**) diluted with wine or water. Checks vomiting of irritable stomach.

To be sold without a licence it must contain half a grain of alkaloid in the ounce.

Weaker preparations, containing about 1 in 20 or 30 of a sweet red wine, are sold by wine merchants. We understand that one well-known brand is made 1 in 16 and calculating on leave as of 0·5% strength, this would mean ⅛ grain Cocaine in 1 ounce.

Uses of Coca.—Coca has been praised as a nervine and muscular tonic, preventing waste of tissue, appeasing hunger and thirst, relieving fatigue, aiding free respiration, and as being useful in various diseases of the digestive and respiratory organs; it is recommended for indigestion, gastralgia, gastrodynia, nausea, sickness, distaste for food, is given to relieve pain, nausea, vomiting or discomfort caused by excess in either eating or drinking, or by pregnancy, and as a cure for morphine and alcohol craving. In using it for the latter in America it is said in some cases to have produced 'Coca Craving.' The leaves are sometimes smoked to relieve asthma; and used generally for the stimulant and narcotic effect of tobacco and alcohol.

℞ ℙ1 **Cocaina** (*Off.*). *Syn.* METHYL-BENZOYL-ECGONINE.

$C_9H_{13}(CH_3)\ (C_6H_5CO)NO_3$=303·261.

Dose.—$\frac{1}{20}$ to ½ grain (**0·003 to 0·03 Gm.**), in a pill or tablet.

This important alkaloid, obtained from Coca, was first isolated by

Niemann in 1860. It crystallises in shining monoclinic prisms.
CONSTITUTION OF COCAINE *is dealt with in Vol. II.*

Cocaine in Liquid Extracts gradually undergoes hydrolysis and the accompanying alkaloids do so more rapidly than the Cocaine. Jowett argues against the galenical preparations of Coca. Amongst the accompanying alkaloids γ-isatropyl-cocaine (*syn.* α-truxilline or Cocamine) is a powerful heart poison which may be present in varying amount. This is stringently excluded from the alkaloid Cocaine and its salts.—P.J. i./13,364.

For Notes on Extraction of (Crude) Cocaine see Vol. II.

SYNTHETIC COCAINE. Possibilities of industrial production as outcome of Willstätter's work.—B. & C.P., Feb. 1924.

Soluble 1 in 10 of 90% alcohol, about 1 in 100 to 150 of liquid or soft paraffin; 10 to 20% of olive oil will assist solubility, freely so in chloroform (2 in 1), ether (about 1 in 4), oil of cloves, and many other volatile oils, and 1 in 10 of castor, and other fixed oils, 1 in 2 of anhydrous lanolin (warmed); 1 in 80 of petroleum spirit. Soluble in water to the extent of 1 in 1300. In 1% Sodium Bicarbonate 1 in 1000. Insoluble in glycerin.

Suppositories, bougies, buginaria and pessaries are sometimes ordered to be made with Cocaine (base) as it is soluble in fats and oils; in our opinion the hydrochloride is better. The same applies to all alkaloids,—soluble salts should be employed for these purposes.

Abuse of Cocaine.

A vast amount of harm has, no doubt, been done by news reports in the daily press concerning illicit drug traffic. The wording of these paragraphs makes a direct appeal to sensuality. It would be salutary for the morals of young people if these articles on the subject were omitted. Police court news is already largely suppressed, for which one is grateful. A timely word to the editorial departments of our great dailies from the Home Office, would, we venture to suggest, prove effectual.

Cocaine fascinates by the rapidity with which it relieves exhaustion and dispels gloom by producing a delightful sense of mental and physical vigour. The habit, according to Prof. W. E. Dixon, B.M.J. i./23,545, is not common. News reports concern rather cases of users of the drug for specific purposes than addiction. The discomforts caused by Cocaine are readily controlled by Morphine. When the patient learns this, the addiction becomes confirmed. **Atropine**, or better, **Hyoscine** is the ***best for treatment of Addiction*** of all kinds. De Quincey found benefit from **Valerian.**

COCAINE SNIFFED UP THE NOSE is readily absorbed. It first powerfully stimulates the brain—the flagging nerve cells are whipped into activity and lassitude and fatigue pass, but a marked depression of the central nervous system succeeds. Abstinence symptoms are less severe than in the case of Morphine. It can be cut off at once.—W. E. Dixon, B.M.J. ii./21,821.

In U.S.A. drug addicts said to number 175,000. 90% of Opium and Cocaine entering U.S.A. said to be for other than legitimate medicinal purposes. Prohibition something to do with it.—W. E. Dixon, B.M.J. ii./21,822. See also a further Abstract of this paper under Morphine.

The following Notes are in approx. Chronological Order.

Since suppression of the Opium Traffic, the Chinese are finding consolation in Cocaine. This is far more serious. In a few months a man may become a mental degenerate. An important sign was detected—epistaxis and ulceration of the nasal mucous membrane. It is taken by snuffling of Cocaine contained in Catarrh Snuffs. The epistaxis is accounted for by the severe congestion produced by the Cocaine upon the Schneiderian membrane and the increased blood pressure incident to its use.—L. ii./10,1317.

Cocaine smuggling into India still proceeds to a great extent. Its use is a growing evil among Indians of all classes.—B.M.J. ii./13,1102.

Abuse in U.S.A. Remarkable figures as to Cocaine (150,000 ozs. illegitimately used per annum), Chloral and Opium.—L. i./13,768.

Cocaine snuffling amongst the underworld of Montmartre has occasioned alarm amongst the French Medical Authorities. Symptoms described—disturbed general sensibility, hallucinations, etc. Cocaine craving can be established in a day or two.—B.M.J. i./13,358.

International Control of Drugs of Addiction.—Sir W. J. Collins, B.M.J. ii./19,369.

"Billie Carlton" Case. Death from overdose of Cocaine self-administered—unlawfully supplied to her by De Veulle in a culpable negligent manner. Other cases of sale contrary to regulations—C.D. Feb. 1/19, p. 93, 245.

Under the Hague Convention ***China has prohibited the import of Opium.*** India is bound to prevent the export of Indian Opium to China.—C.D. Apl. 2/21,454.

Serious allegations against German speculators in clandestine commerce. The drug smuggled out of Germany by soldiers in the Army of Occupation bears the label of Merck of Darmstadt.—B.M.J. ii./21,414.

Perforation of nasal septum in Cocaine snufflers. Cocaine habit alarming at Geneva.—F. G. Crookshank, B.M.J. ii./21,917.

Irritation caused by ulceration on the septum may possibly lead to Cocaine habit. Septal perforation is well known among workers in the irritating atmosphere of stone-masonry and it is peculiarly liable to attack employees in Chromic Acid factories and salt mines. Unfounded suspicion should not enter into the matter.—H. Tilley, B.M.J. ii./21,1008.

Perforation frequently seen in outpatient clinics. Harmless nasal affection not to be confused.—J. F. O'Malley, B.M.J. ii./21,1008.

The perforation is always *circular*, not button hole.—F. G. Crookshank, *ibid.*, 1055.

Cocaine abuse leads to rapid degeneration, morally, mentally and physically. Smuggled mostly from Germany. Mild Cocaine poisoning produces a feeling of general well being (euphoria). It is stated that Cocaine even in therapeutic doses may produce sexual excitement and, so far as reported cases go, appears chiefly in women—from which fact arises the danger for dentists! It is admitted the effects are only occasionally seen or heard of.—B.M.J. i./22,849. We have *never* heard from dentists, of the danger.

Suggestion that the alkaloid should cease to be manufactured but there is no local anæsthetic quite as good as Cocaine.—M.P.C. Sept. 27/22,258.

Alcoholism and drug habit. The late Oscar Jennings made a statement that one in four medical practitioners took drugs. Of twelve varied cases under treatment six were doctors.—Stanford Park, M.P.C. Jan. 24/23,74.

In U.S.A. increase in illicit use of habit-forming drugs, especially Heroin. ***International Opium-Convention making haste slowly.***—B.M.J. i./23,602.

Synthetic drugs not so habit-forming as Cocaine and Morphine.—Geneva Conference, League of Nations, B.M.J. i./22, 724, 728.

Possibility of Cocaine substitutes becoming drugs of addiction.—Committee to Enquire.—B.M.J. i./23,741.

La Cocaine, by Courtois-Suffit (Masson & Cie, Paris) may be consulted.

See also paragraphs under ***Morphine Habit, Abuse of Opium.***

Consult also ***Dangerous Drugs Acts.***

Cocaine Poisoning.—Methods of examination of stomach washings, urine, etc. Limits of fatal doses. 3½ grains injected into the breast of a woman caused death in 20 minutes.—Useful summary to be consulted if required.—B.M.J. i./13,16.

Antidotes.—Stomach-tube. Toxic effects are best counteracted by amyl nitrite, nitro-glycerin, digitalis, strychnine, or ammonia, with strong coffee by mouth or enema, and ether hypodermically (5 minims). Anæsthesia by chloroform and ether may be required to prevent respiratory spasms.

Hyoscine hypodermically, or 10% solution of Calcium Chloride intravenously have been found safe antidotes for incipient Cocaine poisoning.—L.ii./23,1300

Urethral Injection of 3 grains in retention of urine has caused poisoning.

℞ ℙ1 **Bougies of Cocaine** ½ grain (**0·03 Gm.**) or more, with cacao butter. Useful in urethral affections.

℞ ℙ1 **Cocaine-Lanolin**—*Martindale*, containing 10% Cocaine Hydrochloride, is a special preparation useful for dental cavities containing hyper-sensitive dentine prior to filling. A small amount to be carefully sealed in the cavity and left for two or three days.

It is found to act "like a charm" on sensitive erosion cavities.

℞ ℙ1 **Cocaine - Menthol - Phenol.**—Equal parts liquefy and form a paste for inserting into tooth cavities; stops the pain promptly.

℞ ℙ1 **'Cocaine-Menthol-Eugenol'**—Cocaine, Menthol, Eugenol and Alcohol 90% equal parts. Applied on a pledget of cotton wool, followed by jets of cold air, *e.g.*, from a chip syringe, relieves toothache rapidly.

℞ ℙ1 Camphor 5, Chloral 5, Cocaine Hydrochloride 1, warmed, form an oily liquid which cures toothache.

℞ ℙ1 **Cocaine in Clove Oil,** 5%. Relieves toothache and earache.

℞ ℙ1 **Collodium Cocainæ,** 2% in flexible collodion. Allays itching, and is a cure for inflamed chilblains.

℞ ℙ1 **Emplastrum Cocainæ.**—1 dissolved in 50 of melted lead plaster. Useful for intercostal neuralgia, sciatica, tender corns, bruises, &c.

℞ ℙ1 **Nebula Cocainæ Oleosa.**

Cocaine Base 1, Oleic Acid 4, Liquid Paraffin to 20. May be made stronger, but this 5% strength should prove sufficient in most instances. (12 grains of base dissolve in 1 ounce of almond oil.)

In cauterising laryngeal growths a solution of the base in olive oil to anæsthetise the tracheal mucous membrane is useful; it allays the irritating cough so troublesome in these operations.—L. ii./07,1452.

℞ ℙ1 **Oleum cum Cocaina.**

A 2% solution, more or less, if ordered, in almond oil, is mostly used. This is useful for earache. For the eye a 2% solution in **Castor Oil** is used, may be combined with Homatropine; for catheters, a solution in equal parts castor and almond oils is useful.

ℙ1 **Cocaine Eye Drops, Factory Act, Solution No. 1.**

Specifically exempted from ℞ *but caution it is* ℙ1. *See also Dangerous Drugs Acts.*

For a foreign body in the eye.

Dissolve powdered Cocaine (base) 0·5 Gm. in Castor Oil 95 Gm. on a water bath. While still warm add 1 Cc. of a solution containing 0·33 Gm. Mercuric Chloride in 10 Cc. of Absolute Alcohol. Mix by

rotating. Apply with a camel hair brush.—Issued by the Factory Dept. of the Home Office, 1917.

℗ ℙ1 **Unguentum Cocainæ** (*Off.*).—Cocaine 4%. Useful where absorption is required, as in facial neuralgia, shingles, eczema, erysipelas, urticaria, and pruritus (R.O.H. has Cocaine 1, to Soft Paraffin 50; heat to dissolve and stir till cold).

Assay of Cocaine in B.P. ointment.—H. J. Foster, P.J. i./21,479.

℗ ℙ1 **Vaselinum Cocainæ.** Is made with Cocaine (base), 1, 2, 4, and 10%. The 1 or 2% are suitable for eye work, and the 4 and stronger percentages are useful for catheterisation, burns, and for intense sensitiveness of parts, pruritus, &c.

℗ ℙ1 **Cocainæ Citras.**

$[C_{17}H_{21}NO_4]_2C_3H_4OH.(COOH)_3 = 798{\cdot}616$.

Dose.—$\frac{1}{20}$ to $\frac{1}{2}$ grain (**0·003 to 0·03 Gm.**).

In deliquescent white crystals; used by dentists.

℗ ℙ1 **Cocainæ Formas.**

$C_{17}H_{21}NO_4.H.COOH = 349{\cdot}282$.

Dose.—$\frac{1}{20}$ to $\frac{1}{2}$ grain (**0·003 to 0·03 Gm.**).

Prepared by combining Cocaine 303 with 46 of pure Formic Acid. Crystalline needles, ***soluble*** about 1 in 40 of water, and about 1 in 2 of alcohol 90% Slightly soluble in chloroform and ether, Insoluble in olive oil or in vaseline.

℗ ℙ1 **Cocainæ Hydrochloridum.** In numerous Pharmacopœias. $C_{17}H_{21}NO_4HCl = 339{\cdot}729$. To be anhydrous.—F.I.

Usual Dose.—$\frac{1}{20}$ to $\frac{1}{2}$ grain (**0·003 to 0·03 Gm.**), but more may be given, in solution, pill or pastil. (*Off*) $\frac{1}{10}$ to $\frac{1}{4}$ grain.

Fr. Cx. has *maximum single dose*, $\frac{3}{4}$ grain; maximum during 24 hours, $2\frac{1}{4}$ grains approx.

Shining, lamellar crystals, with bitterish taste. One part of Cocaine base = 1·12 of the Hydrochloride.

Soluble 2 in 1 of water, also in alcohol and in glycerin, insoluble in ether, fats, and oils. It will crystallise with 9·5% of water of crystallisation, but the anhydrous salt is preferred. M. pt. 183° C.

Glycerin of Starch is a useful solvent. A solution in this can be applied locally without lint or wool. Keeps well and is economical. —J. T. Hall, B.M.J. i./17,765. L. i./17,824.

Incompatible with ammonium carbonate (soluble in excess), carbolic acid, mercuric and mercurous chlorides. It is also precipitated by borax.

When borax and Cocaine hydrochloride are prescribed together, a weight of Boric Acid equal to that of the borax should be ordered at the same time to prevent precipitation.

In dispensing White Precipitate with cocaine hydrochloride in the form of an ointment, dissolve the cocaine salt in a drop or two of water. Rub the white precipitate down with a little almond oil, mix, and add the remainder of the ointment base—*e.g.*, soft paraffin.

Cocaine in Dental Extractions

℗ ℙ1 **Dental Anæsthetic**—*Martindale*, is used as a local anæsthetic for extraction. It contains 0·85% Cocaine base and Iodine in the requisite chemical combination, together with hæmostatics. It is believed to be harmless in action.

Dose.—The amount used varies with the number of teeth to be removed. In view of the fact that ½ grain of Cocaine should not be exceeded, 50 minims may be considered a maximum. The usual dose may be put at 10 to 25 minims.

(As much as 20 minims of a 10% solution,—10 minims either side of the tooth at 5 minutes interval = 2 grains of Cocaine Hydrochloride has been recommended, but this must be considered excessive).

The injection is made alongside the teeth to be extracted. Some transitory swelling of the gums may be expected after all local anæsthetics.

One may bear in mind that the British Pharmacopœia gives ½ to ⅓ grain approx. as an ordinary hypodermic dose (in the Hypodermic Injection of Cocaine).

The Dental Anæsthetic contains nothing of the nature of Adrenalin, but a small dose of the 1 in 1,000 solution *may be added at the time of use if excessive hæmorrhage be feared,* or it may be injected afterwards in severe operations to arrest primary or secondary hæmorrhage. See also Hæmorrhage, Dental. Therap. Index.

A user of this preparation (P.G.) wrote us (Oct. 16th, 1916): "*I have extracted hundreds of thousands of teeth with your anæsthetic without even-one unsatisfactory operation.*

Some operators make a practice of spraying the cavity after removal of the tooth, with a little 20 volume **Hydrogen Peroxide.**

The following injections are recommended by a distinguished Dental Surgeon:—

Cocaine Hydrochloride 3 grains, Solution of Adrenine (1 in 1,000) 1 drachm, Solution of Hamamelis 7 drachms; also Eucaine 6 grains, Phenol 5 grains, Solution of Hamamelis 1 ounce.—P.J. ii./09,96, No doses stated. 20 minims of the former contain ⅛ grain Cocaine Hydrochloride.

Enquiries fifteen years ago in 48 provincial towns with an aggregate population of 2,138,100 showed 480 available registered dentists, or a ratio of 1 to every 4,454·4 persons.

Notes on Tooth Extraction.—Place the fingers in the sulcus between cheek and gum, and stretch the cheek away from the gum sufficiently to render the mucous membrane taut at its attachment or reflection. It is thin and firm enough under moderate traction to be punctured easily, choosing a spot opposite the point of operation at about ⅛ in. from the jaw, the parts are loose enough to allow 10 or 20 minims to be injected without its escaping after removing the needle. The gum should not be punctured as it is too adherent to the bone, and fluids diffuse in it with difficulty; and with many punctures there is increased risk of sloughing, besides being too painful to some. Complete local anæsthesia is obtained by puncturing thus, and using ½ grain of Cocaine Hydrochloride in 10 minims of lukewarm boiled water. An ordinary needle preferred to the dental short one, as the hand blocks the view.—Percy Furnivall, British Journal of Dental Science.

A 1% solution should be used, 15 to 20 minims of which gives the best results. Congestion always follows the use of Cocaine, and in most preparations Adrenalin (which is also vaso-constrictor) is added to prolong the insensibility and localise the anæsthetic. The injection should be made slowly and as few pricks with the needle as possible. Never push the needle too deep, for injury of the periosteum of the bone with the needle point may be one source of trouble. Rapid injection must be avoided, and never inject into any but healthy tissue. If the gum is septic, cleanse round the tooth to be extracted with some antiseptic on cotton-wool. Use a thoroughly sterilised syringe in good working order. In injecting there

should be resistance to the pressure on the piston. Reinsert the needle if resistance is not met with. If the fluid goes into the gum too easily, it may be due to passage into loose cellular tissue, and this sometimes causes after swelling. There should be little danger of cellulitis, sloughing, or necrosis if the above instructions are followed out. Employ an antiseptic mouth-wash, an astringent may be necessary.—C.D. ii./09,734.

℔ ℙ1 **Injectio Cocainæ Hypodermica, St. Bart.s' H.**

Cocaine Hydrochloride 4½ grains, Potassium Iodide 2½ grains, Thymol ½ grain, Oil of Gaultheria ½ minim, Adrenalin Hydrochloride ½ grain. Distilled Water to 1 ounce. For dental purposes.

℔ ℙ1 **Calorific Fluid** for dental use.

Cocaine Hydrochloride 1, Camphor 10, Clove Oil 4, Ether 25, Chloroform 30, Absolute Alcohol 30.

℔ ℙ1 **Aurinaria Cocainæ Hydrochloridi.** — Ear Cones, contain $\frac{1}{10}$ grain in each with gelatin.

℔ ℙ1 **Guttæ Cocainæ Hydrochloridi, R.O.H.,** 2 or 5%. R. N. H. 2%.

℔ ℙ1 **Guttæ Cocainæ Cum Adrenina.**

Cocaine Hydrochloride 5% in Adrenin Solution (1 in 1,000).

℔ ℙ1 **Injectio Cocainæ Hypodermica** (*Off.*)

Cocaine Hydrochloride 1 in 20 in dilute Salicylic Acid solution (0·15%).

Dose.—5 to 10 minims (**0·3 to 0·6 Cc.**).

Fr. Cx. 1% directed to be heated in the bottle surrounded by boiling water for ¼ hour, or in a steriliser at 110° C. for 10 minutes.

A solution up to the strength of 50% may be prepared in salicylic acid solution 0·15% strength, which is nearly saturated.

The B.P '98 injection was *hypertonic*. Should be *hypotonic* as it would then mix more readily with the lymph, and be carried off more quickly by the lymph circulation. A solution 0·594 Gm. in 10 Cc. is isotonic.—P.J. i./12,357.

The question is frequently asked—***Can Cocaine Hydrochloride Solutions be sterilised by boiling, with impunity?*** In general the reply is that boiling sufficient to sterilise is not injurious.

It is stated that in ordinary glass vessels "which are alkaline," decomposition of Cocaine on boiling readily occurs!—L. ii./22,1129. ***We cannot agree*** that a flask used over and over again gives off alkali sufficient to do it. Secondly if it does it, the Cocaine molecule would only be interfered with ***to the extent of the alkali*** thus given off. The rest—say 99·99% would be intact as Cocaine and the amount of 'decomposition' bodies would do ***no harm.***

Slightly alkaline solutions show 'more' deterioration on boiling than slightly acid ones.—Rippel, Arch. Pharm. Efficiency of Cocaine Solutions is ***not impaired*** by boiling—Rep. Com. Local Anæsthetics.—Chem. Absts. 1922, *cf.* our p. 141.

We deal further with the matter in Vol. II.

Intravenous use of Cocaine Hydrochloride—Enormous dose necessary for anæsthesia; not suitable for man. 5 grains in a 2% solution was injected into the vein of the hand—dizziness and palpitation set in. Anæsthesia even then was not perfect.—P.J. i./11,206.

℔ ℙ1 **Isotonic Cocaine Eye Lotion.**

Cocaine Hydrochloride 1, Sodium Chloride 1·25, Distilled Water to 100. This is isotonic with the tears with which 1·4% Sodium Chloride solution is isotonic.—Pres.

℞ ℙ1 **Hypodermic Tablets** are prepared with $\frac{1}{10}$, $\frac{1}{8}$, $\frac{1}{6}$, $\frac{1}{4}$, and $\frac{1}{2}$ grain of Cocaine Hydrochloride in each.

℞ ℙ1 **Lamellæ Cocainæ, Discs of Cocaine** (*Off.*); **R.O.H.** Discs of gelatin, each containing $\frac{1}{50}$ grain of Cocaine Hydrochloride are for ophthalmic use. These should be prepared in an atmosphere carefully rendered aseptic. Also prepared ℞ ℙ1 containing $\frac{1}{100}$ and $\frac{1}{200}$ grain in each, and in combination with ℞ ℙ1 Atropine Sulphate (*q.v.*) ℞ ℙ1 Homatropine (*q.v.*) and ℞ ℙ1 Physostigmine (*q.v.*)

℞ ℙ1 **Liquor Cocainæ et Antipyrin.**—Cocaine Hydrochloride 5, Antipyrin 5, Phenol 1, Water to 100. Used for painting the interior of the larynx during the operation of thyrotomy, and applied to the nostrils on cotton wool for small operations, *e.g.*, with the cautery.—C. Nourse. Also found useful for general anæsthetic purposes.

℞ ℙ1 **Pastillus Cocainæ Hydrochloridi.** $\frac{1}{10}$ grain (**0·006 Gm.**) in each (or more if ordered). Useful in allaying throat irritation and hoarseness. Also made ℞ ℙ1 $\frac{1}{15}$ grain with **Morphine** $\frac{1}{30}$ grain.

℗ **Pastils of Cocaine Hydrochloride** $\frac{1}{50}$ grain, **with Antipyrin** 3 grains, are prepared. They are useful in the treatment of asthmatic affections.

℞ ℙ1 **Pilula Cocainæ Hydrochloridi.** $\frac{1}{5}$ grain (**0·012 Gm.**) in each (or more, if ordered), with milk sugar.

℞ ℙ1 **Nebula Cocainæ Hydrochloridi.**—May be prepared 1, 5 or 10%, or more if ordered with sterile 'Normal Saline' for general use. **Sprays** for Cocaine Solutions should have fine aperture for the jet.

℞ ℙ1 **'Solubes' Cocaine Hydrochloride** contain 1 and 5 grains for lotions, also $1\frac{1}{8}$ and $2\frac{1}{4}$ grains. Those weighing $1\frac{1}{8}$ grain produce a 1% solution on dissolving in 2 drachms of water, and those weighing $2\frac{1}{4}$ grains with 1 drachm of water produce 4% solution.

℞ ℙ1 **Injectio Cocainæ et Nitroglycerini.** *Dose.*—Up to 15 minims (**1 Cc**)=($\frac{1}{2}$ grain Cocaine Hydrochloride). Cocaine Hydrochloride 5 grains, Nitroglycerin Solution (1%) 10 minims, Distilled Water to 150 minims.—F.N., 1909 (Modified). Nitroglycerin in this way is valuable in counteracting any evil effects of cocaine.

℞ ℙ1 **'Sterules,' Ophthalmic** are prepared containing Cocaine Hydrochloride Solution 10 grains to the ounce (2·3%).

For general purposes ℞ ℙ1 **Large 'Sterules'** (Tube form) are prepared containing 10 minims of Cocaine Hydrochloride Solution 5% and 10% strength, *vide* also Index for **Sterules, Hypodermic.**

℞ ℙ1 **Hypodermic 'Sterules' of Cocaine Hydrochloride** $\frac{1}{3}$ grain, with **Adrenalin** $\frac{1}{1000}$ grain are prepared for painless dental extraction.—(*cf.* Adrenalin).

℞ ℙ1 **Suppositories** and **Pessaries** $\frac{1}{2}$ grain (**0·03 Gm.**), or more. **C.H.W.** has Suppositorium Cocainæ Vaginale, 2 grains Cocaine Hydrochloride in 2 drachms Theobroma basis. S.H. has Pessus 1 grain in 2 drachms.

Experience of use of Cocaine in labour (33 cases), Suppositories ($\frac{1}{2}$ grain), tampons soaked in 10% solution useful in various cases, but with exception of

7 cases there was a varying amount of post-partum hæmorrhage difficult to control. This increased tendency to hæmorrhage attributed to the Cocaine.—B.M.J. ii./90,356.

A 10% solution on wool to rigid os uteri in first stage of labour produces rapid dilatation.—B.M.J. ii./98,1374.

℣ ℙ1 **Injectio Cocainæ et Sodii Bicarbonatis.** Cocaine Hydrochloride ½, Sodium Bicarbonate ½, Chloretone ¼, Distilled Water to 100.

Dose.—2 to 4 drachms (**8 to 15 Cc.**) for *urethral injection.*

This solution is remarkably efficacious for use prior to passing a catheter. According to our experiments the fact of the Cocaine being in part in the *basic* condition renders the solution more efficacious and anæsthetic in effect than a solution of even 4% or 5% Cocaine Hydrochloride, employed in a similar manner. See also 141 *et seq.*

℣ ℙ1 **"Sterules" of Cocaine Hydrochloride, Sodium Bicarbonate and Chloretone (Dry Powder)** contain the constituents to produce 1 ounce of the injection on dissolving in distilled water.

℣ ℙ1 **Compound Cocaine Suppository** of Cocaine ⅙ grain with Morphine ½ grain (Hydrochlorides) is useful for painful hæmorrhoids.

℣ ℙ1 **Tabellæ Cocainæ,** Cocaine Tablets, ⅛, 1/10, 1/12, and 1/20 grain with chocolate. The usual dose is 1/20 grain.

Dose.—1 every quarter, half-hour or hour, quickly eaten and swallowed. Useful for sea-sickness (chloroform or alcoholic sickness) and that of pregnancy.

Sea-sickness may be overcome by internal use of the following:—Cocaine Hydrochloride 0·2 Gm. Iodine Tincture 2 Cc., Water to 150 Cc.—*Dose,* 1 tablespoonful 2 to 4 times daily. More palatable without the Iodine.

℣ ℙ1 **Pastilli Cocaini Hydrochlorici,** P. Jap. IV.

Contain Cocaine Hydrochloride 0·005 Gm. (1/12 grain) with Milk Sugar 0·245 Gm. (4 grains approx.) in each.

℣ ℙ1 **Syrupus Cocainæ.** Hypodermic injection of Cocaine Hydrochloride (*Off.*) 44 minims, Syrup of Orange Flower to 1 ounce.

Dose.—1 drachm=¼ grain.

℣ ℙ1 **Trochisci Cocainæ Hydrochloridi.** 1/12 grain (**0·005 Gm.**) in each. **T.H.** has 1/10 grain.

Brompton H. 1/6 grain in 20 grains.

℣ ℙ1 **Cocaine Hydrobromide also Hydriodide, Sulphate** (deliquescent), and **Lactate** (white amorphous mass) are sometimes used instead of the Hydrochloride with the same dose.

℣ ℙ1 **Cocaine Periodide.** $C_{17}H_{21}NO_4.3I$=684·021 (apparent composition).

Dose.—1/40 to 1/20 grain (**0·0015 to 0·003 Gm.**) increased with care.

When made by the interaction of Cocaine Base and Iodine in suitable solvent (*cf.* Alkaloidal Periodides) this compound is obtained in dark purple crystals containing 44·3% Cocaine.

The Periodide has been made in the author's laboratories (1923). In previous editions, a compound of the composition **Di-iodo-Cocaine Hydriodide,** $C_{17}H_{21}NO_4.HI+I_2$, was described. The true Periodide is now used instead.

This true Periodide is of interest as, in common with others, *e.g.,* Emetine and Quinine, it *retains* its Alkaloid in the presence of

Physiological Acid, but liberates it readily to Physiological Alkali (1·5% and 15·7% of the Periodide respectively to each solution).

Solubility.—Slightly soluble in Alcohol, almost insoluble in Chloroform and insoluble in Ether and water.

Incompatible with alkalis, metal compounds and otherwise as alkaloids.

Pharmacology.—Doses of 1/40 and 1/20 grain were taken by two of the author's assistants (R.J.T. and W.L.C.). No discomfort was caused, and no untoward symptoms observed.

Uses.—Internally, it is suggested in sickness and abdominal pain. The fact of the compound passing through the stomach practically unaltered suggests its possible utility in duodenal ulcer or other painful affections of the bowel. The local antiseptic action of the Iodine liberated, may also be of value.

Dispensing Note.—To be given alone in cachet or 'slipule' (No. 5), preferably after food.

℔ ℙ1 **Cocainæ Nitras, Cocaine Nitrate.**

$C_{17}H_{21}NO_4.HNO_3 = 366·277$

Dose.—$\frac{1}{20}$ to $\frac{1}{2}$ grain (**0·003 to 0·03 Gm.**)

In large colourless crystals, readily ***soluble*** in water. Is compatible with silver nitrate, and if used previously in solution lessens the pain caused by the latter salt.

℔ ℙ1 **Cocaine Nitrite** is also prepared for use in an anti-asthmatic spray (*vide Tucker's Asthma Cure, Vol. II.*).

℔ ℙ1 **Cocainæ Phenas.** *Syn.* **Cocaine Carbolate.**

Dose.—In pill, $\frac{1}{20}$ to $\frac{1}{2}$ grain (**0·003 to 0·03 Gm.**)

A slightly soluble pasty compound, used by dentists and given for gastralgia.

Strongly antiseptic and may be used on cut surfaces, as its coagulating effect on albumen prevents too rapid action.

℔ ℙ1 **Cocainæ Salicylas,** $C_{17}H_{21}NO_4.C_6H_4.OH.COOH = 441·344$.

Dose.—$\frac{1}{20}$ to $\frac{1}{2}$ grain (**0·003 to 0.03 Gm.**). Is in minute snow-white crystals, very deliquescent; it forms a solution which keeps well. ***Soluble*** 5 in 1 of water, $2\frac{1}{2}$ in 1 of alcohol 90%. In spasmodic asthma, the hypodermic injection of a full dose at the beginning relieves the attack.

Uses of Cocaine and its Salts.

Besides rendering the superficial structures of the eye anæsthetic, Cocaine is a mydriatic, and paralyses the accommodation. When applied to a mucous membrane it blanches the part, and simultaneously anæsthesia occurs. The application of an ointment of the pure alkaloid, made with lard, to a surface will remove the pain of eczema, erysipelas, facial neuralgia or shingles, and the irritation of urticaria or pruritus. Burns and scalds should first be brushed over with a 4% aqueous solution of the hydrochloride, and the pure alkaloid combined with Carron oil (Linimentum Calcis), petroleum cerate, or boric acid ointment, afterwards applied on cotton wool or lint. For fissured nipples, or stings and bites of insects an aqueous solution may be applied. The irritability of inflamed mucous surfaces, as in hay-fever, influenza, coryza, bronchitis, spasmodic asthma,

laryngitis, and pharyngitis, is much relieved by the spray of a watery solution of a cocaine salt. Spasmodic and painful affections of the vagina, causing dyspareunia and vaginismus, may be minimised by vaginal injections of a quarter of a grain of cocaine in 1 per cent. oily solutions. In dentistry, it is useful in toothache. The pure alkaloid, being only slightly soluble in water, is less liable to be washed away by the saliva. If a little be inserted in the cavity of a carious tooth and covered with a plug of wool soaked in chloroform of mastiche all pain is obtunded for a considerable time. A strong solution in oil of cloves is also useful. In extraction the **Dental Anæsthetic** will be found effectual. A strong aqueous solution of the hydrochloride may be painted on the surrounding gum as an alternative or supplement.

Solutions of cocaine hydrochloride have been employed topically in excision of the tonsils, cauterizing the turbinated tissue of the nose, painting chancres previous to the application of nitric acid or other caustics, opening abscesses, removing polypi, and many cases of iridectomy and operation for cataract, squint, and the removal of foreign bodies from the eye. For the eye sterile aqueous solutions of the hydrochloride of cocaine of mostly 2, or up to 4% are used, and for other purposes from 4 to 20 or even 50%; of the weaker solutions it is necessary to repeat the application three to five times at intervals of three to five minutes.* Normal saline solution may be used as a vehicle for the ophthalmic solution with advantage. No operation should be commenced within at least ten minutes of the first application. Injurious effects, either local or constitutional, rarely follow its use.

Cocaine is a stomachic, useful after excess either in eating or drinking, in distaste for food, in sea-sickness and vomiting of pregnancy, or from other causes—the **Tabellæ** *antea* are suitable.

Rectal and prostatic pains are relieved by ½-grain suppositories A rectal injection checks diarrhœa and dysentery.

Cocaine is regarded as a general protoplasmic poison. It stops the movement of spermatozoa and white corpuscles. Has a special affinity for nervous tissue.

Whooping Cough often well treated by Cocaine by the mouth, *dose* being on the basis of 1 grain *ter die* for an adult.—L. i./09,35.

Also of value by painting the external auditory meatus and membrana tympani with a pigment. ℞ **Pigmentum Cocainæ et Hydrargyri Perchloridi.** Cocaine Hydrochloride 28 grains, solution of Mercuric Chloride 20 drops, Glycerin 4 drachms, Water 4 drachms, after syringing ears twice or thrice daily with Boric Acid lotion.

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* The *nose* may be plugged with strips of gauze soaked in 20% Cocaine Solution, to which a few drops of 1 in 1,000 Adrenalin have been added. In the *urethra* not exceeding 1% should be used, as absorption is rapid. In the eye 1 to 4%. There is no drug to equal Cocaine in potency as a local anæsthetic—H. S. Souttar, B.M.J. ii./13,70.

When using Cocaine in nose operations patients should be warned to get a full meal before the operation. If this be done, Cocaine is safer than Chloroform or Ether.—B.M.J. ii./13,737.

For small operations, *e.g.*, finger amputation, Cocaine Solution 5%, to which 5 m. of Carbolic Acid and 5 m. of Suprarenalin Solution 1—1,000 have been added to each ounce of the solution, never exceeding 90 m. often less of this. Use a Cresylic Disinfectant to cleanse, and then paint over the affected parts with a 1% solution of Iodine made with Alcohol 90%.—Pr. Mar. 1912

Sufferers from cancer tolerate large doses of Cocaine. It is questioned whether there is some natural affinity between the two. If diagnosis doubtful, and on administration of Cocaine no improvement, would consider growth not malignant. It may be viewed as a diagnostic agent. In cases cited Cocaine was given internally and externally.—B M.J. i./09,274.

For hay fever, Herbert Tilley warns that it may generate Cocaine craving.

In eye work as a local anæsthetic Cocaine has not been replaced.—L i./13, 688; Pres. June, 1913,197.

For excision of an ingrowing toenail, which he performed radically himself, a medical man injected 4 grains of Cocaine in two hours. Satisfied with Cocaine. It was found that a small initial dose may produce faintness. Lay patient down to recover, then proceed with ordinary dose. The first faintness is common.—H. B. Blackburn.

Cocaine 5 Gm. instead of 0·5 Gm. injected into a horse's fetlock. Operation performed. Sweating after about three hours but no violent Cocaine poisoning. Subsequent recovery.—P.J. i./15,109.

Snake bite well treated by large dose——*vide* Snake Bite—Therap. Index.

Deflection of septum operations. Pledgets soaked in Adrenalin solution and 10% Cocaine Hydrochloride, equal parts, then Cocaine injections (5%) into the muco-perichondrium.—J. Donald, Pr. April, 1921.

None of the synthetic local anaesthetics equal Cocaine when applied to mucous membrane. Operations should be preceded by Morphine and Atropine hypodermically. In nose operations *Adrenalin* should be applied followed by Cocaine; injection being made slowly. In throat operations a 5 to 10% solution should be applied first.

When there is suspicion of possible danger, one fourth of the anæsthetic only should be used and the patient watched for possible toxic effects. Soluble tablets of Cocaine recommended to allow of solutions being as fresh as possible. —COMMITTEE APPOINTED BY AM. MED. ASSN.—Jl.A.M.A., July 31,'20, p. 315, Pres. Feb. '21, p. 39.

As a result of comparative tests Cocaine, on the whole, was found preferable to Butyn for aural work.—L.ii./23,1298.

Enucleation of the tonsil under local anæsthetic. For surface anæsthesia a mixture of equal quantities of 10% Cocaine Hydrochloric Solution and Adrenalin Solution used, applied with cotton swabs, and repeated three or four times, followed by infiltration of the tissues, in which the tonsil lies embedded, with a 5% Novocain Solution.—Dan McKenzie, Pr. May 22,314.

Better than substitutes, especially in eye work and rhinology.—A. J. Copeland, B.M.J., ii./24,41.

Local Infiltration Anæsthesia is produced by solutions of cocaine (and eucaine, *q.v.*) used by subcutaneous injections made along the lines of proposed incisions, and then into deeper parts before cutting them, and into the sheaths of nerve trunks to annul sensation in parts of limbs, &c. Its action commences in three minutes, increases for ten to twenty minutes, and mostly disappears within half an hour. The anæsthesia may be prolonged by applying a triangular bandage when possible above the site of injection; this has also the advantage of lessening the risk of toxic symptoms, as the delay of cocaine (and eucaine) in the tissues renders it innocuous, either by fixing it there or destroying it locally. **Cocaine and Adrenalin** are used together—the addition of the Adrenalin (*q.v.*) arresting the bleeding. (**Sterules** of the two are prepared.)

For infiltration a 0·01% solution of Cocaine with 3 to 5 drops of Adrenalin solution 1 in 1,000 to each 100 Cc. is sufficient.

The use of Cocaine and Adrenalin has been advocated for anæsthetising the urethra by swabbing with a plug of cotton wool soaked with 1 Cc. of a 1% solution of Cocaine Hydrochloride to which 3 drops of a 1 in 1,000 solution of Adrenalin have been added.

Cocaine Hydrochloride Solution, 0·5 or 0·25%, with the addition of 3 minims of fresh Adrenalin Chloride Solution (1 in 1,000) to 100 Cc. of Cocaine Solution has been used for skin grafting, excision of small tumours, circumcision, abscesses, whitlows, etc., empyema (specially good results), operations on fingers and toes and fistula in ano.

In gynæcological work Cocaine Hydrochloride as **Dusting Powder**—on cotton wool swabs has been used with good results. Is found to be better than Solutions.

Lumbar Puncture Anæsthesia with ½% solutions, is occasionally practised for major operations. Further details last Edn., p. 328.

Cocaine Ionisation, *see* Iontophoresis, Vol. II.

℗ **Tropacocaine.** *Syn.* BENZOYL-PSEUDO-TROPINE.

Obtained from Java Coca The **Hydrochloride** $C_8H_{14}NO.C_6H_5CO.HCl$=281·703 is freely ***soluble*** in water, has M. pt. 271° C., and is a powerful anæsthetic; aqueous solutions keep well; in the eye causes neither ischæmia nor irritation of hyperæmia. 3% solution recommended; anæsthesia quicker than with Cocaine, but more transitory; the action may be kept up by adding a drop from time to time. Mydriasis occurs occasionally but is slight. Injection into gums in large doses only affected pulse for 10 minutes and did not affect respiration. Solutions can be boiled with impunity.

Three drops of 5% solution are sufficient for anæsthetising the eye, *e.g.* for removing a foreign body.

Sciatica (severe). Tropacocaine 1 Cc. of 5% solution injected into the dural sac in the lumbar region—the nerve exposed by incision and forcibly stretched with the finger. Complete cure and not the slightest recurrence of pain.—B.M.J. i./08,23.

℗ **Tablets (Hypodermic)** contain $\frac{1}{30}$ grain.

Intraspinal Anæsthesia by Tropacocaine.

For operating in hernia, fistula, hæmorrhoids and amputations.

Ampoules containing 1·5 Cc. (25 minims) of 5% Neutral Solution in Normal Saline—Sp. Gr. 1·016—employed, *i.e.*, 20 minims of this solution is suitable for a healthy person weighing about 11 stone. *Maximum dose* 24 minims. For a child 1 year old 4 minims is enough. After a lapse of 40 to 50 minutes a second injection of 8 to 12 minims is given if required. 1,295 cases treated with this method at Queen's Hospital, Birmingham.—J. T. J. Morrison, B.M.J. i./13,1306.

Benzamine, Betacaine. *Syn.* ***Eucaine Hydrochloride.** Eucaine or Eucain B. Benzoyl-vinyl-diaceton-alkamine or Trimethyl-benzoxy-piperidin Hydrochloride, P. Helv.

$C_5H_7N(CH_3)_3(C_6H_5COO).HCl$=283·719.

TRADE MARK: EUCAINE, 193242 of 1896. Registration renewed 1924.

PATENT: 20697 of 1896. Became void in the twelfth year. Now public property.

Dose.—$\frac{1}{10}$ to ½ grain (**0·006 to 0·03 Gm.**) or more.

A synthetic compound allied to Cocaine, in small white opaque crystals, ***soluble*** about 1 in 30 of water (Crystals may deposit on cooling which can be redissolved without harming the salt). 2% solutions are used in ophthalmic work (**Guttæ R.O.H.** 2 or 5%). They may be boiled without decomposing the salt.

Sterules, Hypodermic contain Eucaine ¼ and ½ grain. For dental extraction.

Local Infiltration Anæsthesia (*Barker*) with Eucaine is suitable for very short operations :—

Eucaine and Sodium Chloride Slipules are prepared for producing the 2 in 1,000 solution for infiltration, containing eucaine 3 grains (**0·2 Gm.**) and sodium chloride 12 grains (**0·8 Gm.**) to produce 3½ ounces (**100 Cc.** approx.) of solution. This is practically **isotonic.**

The solution is boiled and on cooling 10 minims Adrenalin Solution may be added.

In the operation 50 Cc. or more (up to 100 Cc.) is injected all round the region to be dealt with.

See also **Barker's Stovaine Glucose Solution.**

Nebula Eucainæ.

Eucaine 10 grains, Sodium Sulphate 4 grains, Distilled Water 1 ounce. **Ophthalmic Lamels** contain $\frac{1}{100}$ and $\frac{1}{50}$ grain.

Adreucaine Sterules contain Eucaine $\frac{1}{12}$ grain and Adrenalin $\frac{1}{4000}$ grain in 8 minims (½ Cc.), for dental and surgical use. For tooth extraction the contents of one (or two) sterules are injected into the gums ten minutes before operating.

Tablets of Eucaine are made $\frac{1}{10}$ grain (**0·006 Gm.**) for internal use.

Unguentum Eucainæ.

Eucaine 1, Olive Oil 2, Hydrous Wool Fat 7. For pruritus, Menthol 2% may be added.

Benzaminæ Lactas (*Off.*). *Syn.* EUCAINÆ LACTAS.

$C_{15}H_{21}O_2N.CH_3CHOH.COOH = 337·314.$

Dose.—$\frac{1}{8}$ to ½ grain. (**0·008 to 0·03 Gm.**).

A white crystalline salt.

Soluble about 1 in 5 of water and about 1 in 8 alcohol (90%).

Incompatible with salicylic acid.

For ophthalmic work and in dentistry employ 2 to 3% ; for infiltration 0·1% with Sodium Chloride 0·8% ; for regional anæsthesia 2·5% ; nose, throat and ear 10 to 15%. Solutions can be boiled.

Slower in action than cocaine, less toxic, and anæsthesia more prolonged, while the heart is not affected, nor the pupil dilated.

Sciatica has been treated by injections.

Larnygeal tuberculosis, relief of pain of, by injecting a solution of Eucaine 2 grains in 1 ounce of 80% alcohol with a blunt needle. *Dose.*—About 1 to 2 Cc. into the laryngeal nerves.—Dundas Grant's method.—L. ii./13,1111.

Urethral Injection. 1 to 2% solutions may be used to relieve pain.

Sterules (Hypodermic) of **Eucaine Lactate** ¼ grain (0·016 Gm.), also ½ grain (**0 03 Gm.**).

***Holocain Hydrochloride.** (T.M. 202036). *Syn.* **Phenocain.**

$$CH_3C\begin{matrix}=N.C_6H_4.OC_2H_5 \\ <NH.C_6H_4.OC_2H_5,\end{matrix} \quad HCl = 334·75.$$

The Hydrochloride of para-diethoxyethenyl-diphenylamidine in small colourless shining crystals.

Soluble 1 in 55 of water. ***Incompatible*** with Alkalis.

As an anæsthetic in ophthalmology, 2 to 5 eye drops of 1% solution, but it is *not adapted for hypodermic use.*

Sterules of Holocaine Hydrochloride Solution 1% are prepared.

***Alypin.** (T.M. 322518). *Syn.* **Amydricaine, Benzoyl-tetramethyl-diamino-ethyl-di-methyl-carbinol Hydrochloride.**

$C_6H_5COC_2H_5CO.[CH_2N(CH_3)_2]_2HCl = 314{\cdot}772$.

Dose (Internally).—$\frac{1}{20}$ to $\frac{1}{2}$ grain (**0·003 to 0·03 Gm.**).

Crystalline powder melting at 169° C. ***Soluble*** in Water 1 in 1 and 1 in 4 Alcohol 90%.

Solutions 0·025 to 0·5% or up to 10% (strong solutions keep well, but weak ones may become cloudy ; may be sterilised by boiling), efficient in eye work,—2% strength produces insensibility of cornea in sixty seconds. Non-toxic. It produces no mydriasis nor disturbance of accommodation.

For lumbar anæsthesia has been used in ¼ to 1 Cc. injections of 2% solution.

For infiltration 0·01 to 0·1% solution has been used with same quantities of Cocaine Hydrochloride in 0·2% Sodium Chloride Solution.

In sickness and post-operative vomiting internally it acts like Cocaine.

Alypin Nitras. Is compatible with silver nitrate.

Has vasodilator action, not constrictor like Cocaine.

Alypin Tablets, ⅓ grain, dissolved in 1 Cc. water produce a 2% solution suitable for use in *dentistry* and minor surgery, and for eye work (also made with Suprarenin 1/5,000 grain) ; 2 drops of 'Adrenalin' may be added.

Tablets, ⅚ grain, dissolved in 1 Cc. produce a 5% solution suitable for *local anæsthesia* and for nose, ear, throat and urinary tract (also made with Suprarenin Borate 1/2,000 grain).

Tablets, 3⅓ grains, dissolved in 1 Cc. produce a 20% solution for *anæsthetising* surfaces by local application (also made with Suprarenin Borate 1/2,000 grain)

Injectio Alypin cum Suprarenin R.O.H. — Alypin 1, Suprarenin 0·0025, Sterilised Distilled Water to 100.

Alypin in 10% solution more toxic than Cocaine of the same strength.—L. ii./23,1300.

Aminobenz, '* Orthoform, New,' the Methyl ester of *Meta*-amido-*para*-oxy-benzoic Acid (Methyl-amino-oxybenzoate P. Helv.).

$C_6H_3.NH_2OH.CO.OCH_3 = 155{\cdot}12$.

T.M.: ORTHOFORM, 215951/1898, renewed 1912. PATENTS 12,179/1897 and 22,106/1898. Both ***Expired.***

Manufacture.—The following steps are involved :

Oxidise *p*-Nitro-Toluene with Chromic Acid and Sulphuric Acid to *p*-Nitrobenzoic Acid. Reduce this with Zinc and Hydrochloric Acid to *p*-Aminobenzoic Acid. Diazotise with Sodium Nitrite and Hydrochloric Acid and heat to form *p*-Hydroxy-Benzoic Acid. Convert this into its Methyl-Ether by means of Methyl Alcohol and Hydrochloric Acid Gas. Nitrate with Nitric and Sulphuric Acid mixture to produce *m*-Nitro-*p*-Oxy-Benzoic Methyl Ester and finally reduce to the *m*-Amino compound.

Note.—The reductions are the principal difficulties. As reducing agents worthy of consideration are Sodium Disulphide and Sodium Hydrosulphite.

Dose.—1½ to 3 grains (**0·1 to 0·2 Gm.**) for stomach ulceration.

A white crystalline powder, possessing local analgesic and antiseptic properties. Is slightly soluble in water, in alcohol 90% 1 in 7.

The **Hydrochloride** $C_6H_3.OH.NH_2COOCH_3,HCl = 191{\cdot}618$ is soluble about 1 in 9 of water ; action of base is more prolonged.

A 10% aqueous solution of the hydrochloride is used, or 10 to 20% with lanoline or paraffin ointment or collodion solution of pure orthoform, or this

as a dusting powder, may be employed to alleviate pain in sores or burns, but has little action unless there is a breach of surface.

Has relieved whooping-cough and laryngeal tuberculosis by insufflation.

Insufflatio Orthoformi cum Resorcin, C.L.T.E. Resorcin 2½ drachms Orthoform to 1 ounce.

***Kerocain** (T.M. 373550). *Syn.* *Novocain. Procaine, **Para-Amino-Benzoyldiethyl-Amino-Ethenol Hydrochloride.** Fr. Cx. Supp. 1920, Ph. Ital. IV., P. Jap. IV., P. Argent. II., Ethocaine.

*Aethocaine is T.M.389240.

C_6H_4 (NH_2) $[CO_2.C_2H_4N.(C_2H_5)_2]$ HCl=272·709.

Dose, subcutaneously.—$\frac{1}{6}$ to 1 grain **(0·012 to ·06 Gm.).**

Max. Single Dose per os (Fr. Cx. Supp., 1920) 0·1 Gm. (1½ grains); *Max. during* 24 *hours* 0·25 Gm. (4 grains).

Trade Mark 'Novocain' No. 276477. Permission to use granted to British firm. 'Suspension in favour of.'—See C.D. Oct, 20/17, p. 890.

A licence to use the enemy patents (*vide* 17162/1905) was also granted to a British firm. This patent is not in the process of manufacture but in the production of a compound of therapeutic value.—C.D. i./16,653. It has now lapsed.

So far as we are aware there is only one British firm making the compound.

A colourless crystalline salt melting at 156° C. Soluble 1 in 1 of water. In absolute Alcohol 1 in 30 nearly (by experiment). A cocaine substitute. 0·25 to 2% solutions are for hypodermic use.

Incompatible with Alkalies, Tannin, Calomel, Potassium Dichromate, Potassium Permanganate and Silver Salts. With the latter use Novocain Nitrate, *s.a.*

Uses.—A powerful local anæsthetic, but its effect is very transient. A drop of 5% solution anæsthetises the conjunctiva sufficient for superficial operations. It is well tolerated by the tissues, but has been called a poor substitute for cocaine.

Infiltration Anæsthesia has been practised by 200 Cc. of 0·5%. Solution in Normal Saline—a maximum dose—this is sufficient to anæsthetise the area for most operations. 50 to 75 Cc. is enough for a moderate size elbow. 150 Cc. for a knee.

The following **Tablets** are prepared with addition of Adrenalin :—

(A.) For Infiltration Anæsthesia of Thick Layers of Tissue and Hypodermic Injections in General Surgery.

Novocain 0·125 Gm. Adrenalin 0·000125 Gm.

Dose.—One tablet dissolved in 25 Cc. Normal Saline Solution makes a ½% Novocain Solution. *Max. dose.*—125 Cc.

B.) For Anæsthesia of Nerve Centres and Larger Nerves (Local Anæsthesia.)

Novocain 0·1 Gm. Adrenalin 0·00025 Gm.

Dose.—One tablet dissolved in 5 Cc. Normal Saline Solution makes a 2% Novocain Solution. *Max. dose.*—5 Cc.

(C.) For Spinal Anæsthesia.

Novocain 0·05 Gm. Adrenalin 0·000083 Gm.

Dose.—One tablet dissolved in 1 Cc. Normal Saline Solution makes a 5% (Isotonic) Novocain Solution. One to 3 Cc. may be used.

(D.) Without Adrenalin.

Novocain 0·2 Gm. Sodium Chloride 0·09 Gm.

Dose.—One tablet dissolved in 10 Cc. sterile distilled water makes a 2% Novocain Solution.

(E.) Dental Tablets.

Novocain 0·02 Gm. Adrenalin 0·00005 Gm.

Dose.—One tablet dissolved in 1 Cc. Normal Saline Solution makes a 2% Novocain Solution.

1 to 2 Cc. for one or two extractions.

NOVOCAIN DENTAL SOLUTION (2%). *Dose.*—1 to 2 Cc. is also prepared :—
Novocain 0·02 Gm. Adrenalin Solution (1 in 1000) 1 drop. Sodium Chloride 0·006 Gm. Thymol 0·0006 Gm.
(F.) **Without Adrenalin.**
Novocain 0·05 Gm.
One tablet dissolved in 1 Cc. Normal Saline Solution gives a 5% Novocain Solution.

Fischer's Modification of Ringer's Saline Solution (*q.v.*) is sometimes used instead of Normal Saline Solution for the above. Kerocain may replace Novocain.

Injectio Novocainæ cum Suprarenin, R.O.H.—Novocain 1 or 2, Suprarenin 0·00125, Sterilised Distilled Water to 100.

Dose.—Up to 1 drachm of the 2% ; *up to* 2 drachms of the 1%

In eye work may be employed, *e.g.*, for excision of the lachrymal sac, and for other minor operations.

Toxic symptoms during use of Novocain. 2 drachms of 1% Solution with ¾ minim of 1 in 1,000 Adrenalin Solution caused the pupils to be widely dilated and fixed. Consciousness had gone and a cold, clammy sweat broke out. Pulse slowed, body became rigid for fully a minute. Recovery with Strychnine. —L. i./13,561. Death from use in dental work.—B.M.J. ii./10,2052.

Solutio Ethocainæ, St. Th. H. ½ to 10% in Saline.

Solutio Ethocainæ Composita, St. Th. H. *Syn.* DUNHILL'S SOLUTION. Ethocaine 3 grains, Adrenalin Solution 7½ minims, Normal Saline Solution to 3½ ounces.

Solutio Ethocainæ et Adrenalini, St. Th. H.
Ethocaine 4, Adrenalin Solution 10, Water to 100.

Sterules, Hypodermic of Novocain, ⅓ grain (0·02 Gm.), also **Novocain** ½ grain (0·02 Gm.), **with Adrenalin** 1/1,000 grain, are prepared.

Toxicity and destructive power on tissues much less than of Cocaine.—B.M.J. ii. 09,783. On the other hand one reads :—

Novocain-Suprarenin Spinal Anæsthesia.—In 63 cases, three of incomplete anæsthesia, six in which Ether had to be used, one of collapse and another of "air hunger."—L. ii./13,1854 ; *see also* Pr. 1911,240.

Novocain with Strychnine is also employed for producing spinal analgesia.

Regional Anæsthesia is a form of local anæsthesia, using a stronger solution than that for local infiltration. A small quantity is introduced round the nerve trunks, which supply the parts to be operated on at some part of their course, which is anatomically accessible. This form of anæsthesia has been effected with a Solution of Novocain 2, Sodium Chloride 0·5, Distilled Water 100 Five drops of a 1 in 10,000 Solution of Adrenalin are added to each 20 Cc. of Solution immediately before use.—For Technique *vide* Felix Rood, B.M.J. ii./12,1701.

Supraclavicular Anæsthetization of the brachial plexus with 20 Cc. of 2% Novocain Solution, with addition of Adrenalin. Stated to be convenient and free from danger. By its use severe operations on the arm can be performed painlessly and without shock. Definite paræsthesia must be obtained in the arm and hand before the injection is made.—B.M.J. i./13,388.

Intra-arterial anaesthesia, by 50 to 100 Cc. of 0·5% Novocain into an artery circulation being arrested by a tourniquet. Analgesia develops in 1 to 2 minutes.—B.M.J. ii./13,392.

Spinal Anæsthesia with Novocain. 5% solution with Mannitol. Dose varied from 0·06 to 0·08 Gm. of Novocain. No safer than Stovaine and larger dose has to be used.—C. C. Holman, L. i./16,955.

Novocain ¾ Gm., Magnesium Sulphate ½ Gm., in water or saline 100 Cc. Boil and when cold add Adrenalin solution 1 Cc. to each 30 Cc. This amount is usually enough to completely anæsthetise wound area—cranial injuries in war.—J. Anderson, B.M.J. ii./17,42.

Kerocain and Cocaine solutions with adrenalin in concentrated form for dilution a convenient number of times, *e.g.*, 1 : 40 satisfactory in use. A 15% Sodium Chloride solution is bactericidal ; with addition of 7½% Cocaine

is slightly less bactericidal and with 7½% Kerocain is still less.—H. Macnaughton Jones, L. i./18,904.

Intrasacral extradural injection of Novocain. A new method for operations on hæmorrhoids, fistulæ, and other conditions in and about the anus.

Dose.—20 Cc. of 2% Novocain to which five drops of 1 in 1000 Adrenalin solution is added—the amount of Novocain thus exceeds 6 grains. 15 grains have been used in a local or regional anæsthesia and even 35 grains have been used.—S. R. Meaker, B.M.J. i./19,569.

If kept sterile and out of contact with air, Novocaine solutions will keep unchanged indefinitely.—M. L. Bonar, Pres. Dec. 23,413.

Local anæsthesia in operations on the anal region effected by injection of solution consisting of Novocaine 2%, Adrenalin (1 : 1,000) 1% and Phenazone (Antipyrin) 1%. An average injection of 2 ounces, preceded by hypodermic injection of Morphine 1/8 grain and Hyoscine Hydrobromide 1/200 grain.—E. G. Martin, per Pres. April '23,147.

Sterules of Novocain 0·15 Gm., Caffeine 0·12 Gm., Sodium Benzoate 0·15 Gm. in Sterile water 3 Cc.

Dose.—2.5 Cc. of the contents.

In spinal anæsthesia the depressing effects have been prevented by the use of Caffeine. The amount should not be sufficient to mask the effects of the drug.

A case is reported in which a man of 71 who collapsed whilst undergoing prostatectomy under spinal anæsthesia, recovered on the injection of 0·25 Gm. Caffeine into the spinal subarachnoid space. 15 minutes' artificial respiration had been unsuccessful.—M.P.C. Mar. 14/23, p. 208.

Novocain, Identification of, see Vol. II.

Allocaine Lumière is a preparation chemically identical with Novocain. It is used in conjunction with Adrenalin.

Allocain S.—Ethyl-Mydriatine Hydrochloride. A new local anæsthetic stronger than Novocain and weaker than Cocaine. On account of the slight irritation caused by its acid solutions and of precipitation by tissue fluids its use is limited. Adrenalin, Ephedrine, Mydriatin are allied chemically.—S. Kubota, Jl. Pharm. and Exp. Therap., Feb. 1919.

Anesthone—Para-amido-Benzoic-Ethyl-ester. Amino-benzoic-Ethyl ester; Para-Amido-Ethyl Benzoate; Benzocaine. ✱Anæsthesine (T.M : 244958/1902, Renewed 1916).

$NH_2 . C_6H_4 . COO . C_2H_5 = 165·141.$

Dose.—3 to 8 grains (**0·2 to 0·5 Gm.**) in powder or cachets.

Manufacture.—Prepare *p*-Nitro-Toluene by adding slowly Nitric Acid (Sp. Gr. 1·4) 105 and Sulphuric Acid 175 to Toluene 100 keeping the temperature of the mixture below 20° C. The product contains about 35% of the *para*-body, the remainder being mostly *ortho*- (with very small amount of *meta*-).

The *para*- compound is separated by cooling to 5° C. in a freezing mixture. It separates in yellow needles, which must be removed rapidly either by centrifuge or filter pump while the temperature is low, otherwise the crystals redissolve as the temperature rises to normal.

Crystalline *p*-Nitro-Toluene 50 is now oxidised to *p*-Nitro-Benzoic Acid by boiling with Chromic Anhydride 250 and Sulphuric Acid 110 diluted with water 450. (*p*-Nitro-Benzoic acid forms yellow crystals with M. Pt. 238° C.)

The next step is to reduce with iron and hydrochloric acid to *p*-Amino-Benzoic Acid and finally convert into the ethyl ester by dissolving the body in absolute alcohol and passing dry Hydrochloric Acid into the solution.

Note.—Patent 16,684/1903 lapsed in 1908. Corresponding U.S. Patent 761,998/1904 granted to E. Ritsert and W. Epstein, deals with the manufacture of Esters of 3 : 4 *Di*amido-benzoic Acid.

An example of the manufacture given in this patent specification *starts* from the above Ethyl-*p*-amido-benzoate, which is converted into the Acetyl compound, this into the nitro compound, this into Ethyl-meta-nitro-*p*-amido-benzoate which is reduced to Ethyl 3-4—diamido-benzoate.

The compound is almost insoluble in water, ***soluble*** 1 in 8 of alcohol 90%, also 1 in 50 of Olive Oil, and easily in Ether, and Chloroform. M. Pt. 90 to 91° C. Has a numbing taste.

To relieve hyperæsthesia of the stomach and dyspepsia; local insufflations for pharyngeal and laryngeal affections, bougies for urethritis 3 grains, and suppositories 10 grains for hæmorrhoids. Ointments 10% for burns, eczema, and intertrigo.

Pneumococcic (and tuberculous) infection of the throat—in a case of difficulty in swallowing greatly relieved by applications of anæsthesine dissolved in Palm Oil—in form of a spray.—B.M.J. i./09,1527.

***Rhinoculin** (T.M. 308800) **Cream, Powder and Spray contain Anæsthesin, Paranephrin, Subcutin, Glycerin and Bori c Acid, for use in hay fever.**—Gehe.

Anesthone Cream.

Anesthone 10%, Adrenalin Chloride 0·005% in Ointment basis. A quantity the size of a pea applied to the nasal mucosa when necessary gives relief in hay fever and as a palliative in allaying irritation congestion and inflammation of the nasal mucous membrane.

Anesthone Tape ½ inch wide for "packing" is also made.

***Stovaine** (T.M. 261296).—*Syn.* CHLORHYDRATE D'AMYLÉINE, FR. CX. Supp., 1920, Ph. Ital. IV., P. Argent II., AMYLOCAINE, BENZOYL-ETHYL-DIMETHYL-AMINO-PROPINOL HYDROCHLORIDE.

$C_6H_5CO.C_2H_5.CH_3CO.CH_2N(CH_3)_2.HCl = 271·714$.

Dose.—Per os and hypodermically ⅓ to ¾ grain (**0·02 to 0·05 Gm.**). For lumbar anæsthesia, *dose* from ⅓ to 1½ grains (**0·02 to 0·1 Gm.**).

Max. single dose. FR. CX. Supp. 1920.—0·08 Gm. (1⅓ grains approx.); *max. during 24 hours* 0·15 Gm. (2½ grains approx.).

In small white crystals, M.pt. 175° C. ***Soluble*** (by experiment) n water about 1 in 13, in alcohol 1 in 3, almost insoluble in ether.

Stovaine does not come under regulations of the D.D.A.

Uses.—Anæsthetic (2 to 4% in eye work), vaso-dilating, comparatively non-toxic. It is stated not to cause headaches, nausea, vertigo, or syncope.

Intraspinal Anœsthesia with Stovaine.

(A.) Stovaine-Glucose Solutions (*mainly.*)

"The ideal solution for anæsthesia should be of such strength as to be of the same osmotic tension as the blood serum. It should neither produce shrinking nor swelling of the blood or tissue cells by osmosis."

A. E. Barker employed 1 *Cc. injections of* 5% *Stovaine with* 5% *Glucose*—without any Adrenal derivative of any kind. Often the dose may be reduced to 0·8 Cc., sometimes increased to 1·2 Cc. The Sp. Gr. of this solution is 1·0230.

Using this solution—of relatively greater density than that of the Liquor Spinalis (which is 1·0070)—a small dose of the anæsthetic drug can be employed and the severest operations can be performed. By carefully adjusting the curves of the spine beforehand to suit the purpose in hand either a high or low anæsthesia can be produced by gravitation. In the amputation of a limb, for example, the lower of the two (whilst the patient lies on his side) can be anæsthetised whilst the upper remains entirely unaffected by the drug. The lowering of the head in any operation is not favoured. The best results are obtained by not altering the level of the body after injection, excepting in cases of the labouring class advanced in life, where the spinal column may be almost rigid —here the pelvis may have to be raised. Usually 5 to 10 Cc. of cerebro-spinal

fluid is withdrawn before injection. Any alteration of posture may be made providing the relative levels of head and pelvis remain as before.

The equivalent of 0·06 Gm. Stovaine found to be sufficient for nearly all purposes. As a rule anæsthesia was established in 5 to 7 minutes for the groins and 8 to 10 for the epigastrium. There is almost always pyrexia (rarely higher than 101° F.). In no case sign of post-operative shock. Longest period of analgesia (using 0·08 Gm.) was 2 hours, largest total dose 0·135 Gm. Highest analgesia—to clavicles.

Review of 500 cases varying from severest abdominal to the most insignificant fistula in ano using Barker's Solution.—L. McGavin and R. D. O'Leary, Pr. Mar. 1912.

The canal is punctured between second and third lumbar interspaces,—patient in sitting posture. 5 Cc. of fluid allowed to escape and then the injection made. Anæsthesia within ten minutes, and lasts for about an hour. Headache following relieved by Phenacetin. Advantages—absence of post-operative shock, complete muscular relaxation, no venous engorgements or respiratory movements, no starvation, and no post-operative sickness. Contra-indicated in cases of advanced sepsis.—C. H. Allen, L. i./13,1100.

Tuffier favours the *intradural* method of spinal anæsthesia. He is not in favour of Strychnine nor Suprarenin added to the fluid. The *extra-dural* injection made between the sacral and coccygeal vertebræ is a less valuable method. Novocain regarded as safest.—B.M.J. ii./13,392; L. ii./13,554,1854

W. W. Babcock reports 5,000 cases, chiefly under Stovaine. Pre-existenc shock a contra-indication to the method. Neurotics unsuited.—L. ii./13,1855.

Bedeschi reports 924 spinal stovainisations. *Dose* given, 0·04 to 0·075 Gm. In one case as result of inverting the patient the analgesia reached to the top of the head. Pallor, sweating, nausea, and rectal incontinence not infrequent. —L. ii./13,1855.

0·9 Cc of the Solution (=0·045 Gm. Stovaine) maintains analgesia to level of the umbilicus for 45 minutes. 400 operations with good result.—Maj. J W. H. Houghton, R.A.M.C., L. ii./12,1008.

Spinal Analgesia in a variety of operations with Stovaine 0·04 Gm. Sodium Chloride 0 0011 Gm., water 1 Cc. Stovaine itself is antiseptic; the solution is heated to 80/90° C. for 10 minutes.—N.M Bey, L. ii./18,141.

For abdominal operations spinal anæsthesia has very strong claims. It is a gain to have a completely flaccid abdominal wall and quiet thoracic respiration. Barker's heavy solution satisfactory.—J. Morley, L. ii./16,728. P. P. Cole *ibid* p. 645 prefers 10% Stovaine solution in Saline.

Stovaine preferred to Novocain.—F. S. Rood, L. i./19,14.

Stovaine 10% Solution with maximum dose 0·03 Gm. and without addition of Glucose in spinal anæsthesia for suprapubic prostatectomy.—H. M. Page, L. i./21,800.

Spinal anæsthesia with Barker's formula in abdominal operations.—A. H. Southam, B.M.J. ii./21,592.

For laparotomy 2 Cc. doses of Barker's formula.—S. A. Lane, L. i./23,129.

Stovaine 10% with Sodium Chloride 10%. *Dose.*—0·75 Cc.—A. Morrison, B.M.J. ii./21,1056.

Solutio Amylocainæ St. Th. H. is 2½ or 5%.

Solutio Amylocainæ et Glucosi, St. Th. H., contains 2½ or 5% Glucose in addition in each instance.

B.) Stovaine-Dextrin Solution (Tyrrell Gray).

This Solution contains Stovaine 3%, with Dextrin, Suprarenin, &c. Employed at the Great Ormond Street Hospital for Sick Children.

'Sterules' 1·5 and 2 Cc. (=0·045 and 0·06 Gm. Stovaine) of the Solution are prepared.

The diminished toxicity of Stovaine is due to it being slowly diffusible. This property is accelerated by administering it with diffusible fluids. Dextrin is a suitable addition, it being readily soluble, and innocuous. It appears to help in controlling vomiting. It also delays absorption.

Normal Saline is also used in strength isotonic with cerebro-spinal fluid, for it has been shown that though the diffusibility of Dextrin-Stovaine Solution is above that of cerebro-spinal fluid when estimated in relation to water, yet when introduced into cerebro-spinal fluid, changes take place which make its diffusibility considerably less than laboratory experiments indicate.

A case of enterectomy under spinal anæsthesia of Stovaine and Dextrin—in an infant seven months old—recovery.—L. i./10,364 ; B.M.J. ii./11,497.

Chaput says, in persons over 40 the intraspinous ligaments are often calcified, and so a lateral puncture or incision through the structures under Ethyl Chloride Spray is necessary. He withholds food and gives Chloral Hydrate and Potassium Bromide ½ hour in advance. He excludes children under 12.—L. ii./13,1855.

Tyrrell Gray, on the other hand, strongly advocates the method for even very young children.—B.M.J.ii./13,392 ; L.ii./13,554 ; *see also* B.M.J.ii./11,497.

(C.) Ⓟ Stovaine Strychnine Injection (JONNESCO).

Dose.—From 0·01 Gm. Stovaine with Strychnine Sulphate ⅓ mgr, for ages 1 to 5 years, up to 0·1 Gm. Stovaine with 1 mgr. Strychnine, dissolved in 1 Cc. Sterile Water for adults.

The higher doses to be used with caution.

Through fear of the Stovaine interfering with the action of the heart and lungs, operations have been confined to parts below the waist line, but the employment of Strychnine in conjunction was believed by Jonnesco to render such operations safe, but the method does not show a high percentage of safety. Strychnine is not always to be depended upon for prevention of respiratory paralysis Stovaine anæsthesia is not entirely devoid of danger.

Stovaine intraspinally with small quantity Strychnine added.—A. A. Morrison, B.M.J. ii./21,745.

(D). Stovaine Caffeine Injection (JONNESCO).

Dose.—From 0·02 to 0·05 or 0·1 Gm. Stovaine with Caffeine 0·5 Gm. now preferred to the Strychnine method (*antea*). 5,000 cases.—T. Jonnesco, Press. Méd. Oct. 28, 1922, p. 929.

Sterules of the above strengths are prepared.

Favourable results in spinal anæsthesia with Stovaine and Caffeine.—B. Desplas, L. ii./23,1235.

Potassium Sulphate 0·25 to 0·5% added to local Anæsthetics, useful—increases the effect. *cf. Note* to Potassium Sulphate.

Indications and Contra-indications for Spinal Anæsthesia.

Spinal analgesia should be restricted to certain exigencies. Cases for which local or venous anæsthesia are inadequate—operations involving danger of great shock, severe injuries associated with shock, urgent operations. For rectal surgery, prostatectomies, *abdominal operations especially*, but operations above the umbilicus, *e.g.*, thyroidectomy and extirpation of the larynx, are performed with it.—B.M.J. ii./10,766 ; Pr. 1911,227 *et seq.*

Tyrrell Gray finds the method of value in diminishing shock, valuable in *renal disease*, disease of the *lungs*, and when *muscular relaxation* is desirable.—B M.J. ii./10,766.

Operations which can be performed under either local or venous anæsthesia with sure success. Acute Infective Diseases, Suppurating processes in the neighbourhood adjacent to the proposed site of puncture ; alterations in the spinal column, diseases of the central nervous system, recent syphilis, high temperature from some unknown cause ; if the patient cannot rest in bed for 24 hours after the injection. Hysterical, very excitable and nervous patients. In these cases a subcutaneous injection of one or more doses of Scopolamine and Morphine one or two hours prior to the injection of the Anæsthetic Solution into the spinal canal works well. The excitability no longer existing, spinal anæsthesia can be proceeded with.—Pr. 1911, p. 227 *et seq.*

To examine urine and liquor cerebralis for Stovaine see Vol. II.

For use of **Stovaine with Adrenalin** *v.* **Adrovaine.**

℞ ℙ1 **Stovaine Solution.** ***For Internal Use.*** *Dose.*—For persistent vomiting 5 to 10 minims every 2 hours without either food or drink. Later 3 to 5 minims before a meal :—

Stovaine 15 grains, Atropine Sulphate ½ grain, Morphine Hydrochloride 3 grains, Chloroform Water 1 ounce.

Compresses 5 to 10%. **Gargle** 0·5% (flavoured).

Glyco-Gelatin Pastils $\frac{1}{20}$ grain (**0·003 Gm.**). **Stovaine Snuff** for coryza 1 to 5% with Bismuth Carbonate and Milk Sugar are used.

Stovaine Ointment for painful wounds and hæmorrhoids :—

Stovaine 0·7, Adrenalin Solution 20, Paraffin Ointment 100.

Apothesine. *Syn.* GAMMA-DIETHYL-AMINO-PROPYL CINNAMATE.

An anæsthetic with action as profound and more persistent than Cocaine. Less toxic than Cocaine.

Tablets 1¼ grain. One in 60 minims of water makes a 2% solution.

Tablets ⅔ grain with Adrenalin $\frac{1}{1500}$ grain. One in 30 minims of water makes a 2% solution with 1 in 50,000 of Adrenalin.

Dental Tablets ⅓ grain with $\frac{1}{2500}$ grain Adrenalin to dissolve in 18 minims of water.

Solution containing 1·5% Apothesine with 1 of Adrenalin in 60,000.

Effective, especially when combined with Adrenalin but relatively inefficient when applied to mucous membrances. May also be used for spinal anæsthesia. Solutions may be sterilised.—Jl.A.M.A., '20, p. 265, per Pres.

Phenolaine.

Dose.—For general surgery, *e.g.*, for hernia or appendicitis use 2 drops of Phenolaine to each ounce of sterile water. Not more than 6 ounces of the dilution should be used at one time. For teeth extraction use 8 drops to one ounce of water.

The preparation has been used in a large number of operations without trouble as regards bleeding or subsequent after effects. It does not produce vasodilation on subcutaneous or intramuscular injection. Amputations of the breast have been conducted with 12 drops in 6 ounces of water.

Corneal opacities treated by subconjunctival injections of Phenolaine—see 'Ophthalmic Surgery' by V. Nesfield, reviewed.—L. ii./22,1128.

Gives prolonged anæsthesia in direct contact with nerve fibres.—A. J. Copeland, B.M.J. ii/24,41.

"Psicain" the acid tartrate of *d*-ψ cocaine,a synthetic Cocaine-isomer. A white powder, soluble in 4 of water, yielding a faintly acid solution. Said to be an improvement on cocaine.—C.D., July,'24,63.

Butyn is stated to be *para*-AMINO-BENZOYL-*gamma*-DI-*n*-BUTYL-AMINO PROPANOL SULPHATE.

Dose.—By *hypodermic injection* 1 Cc. and upwards of ½ or more per cent. solution according to circumstances.

Chemically it is allied to cocaine and novocain. A white amorphous powder, freely soluble in water.

A local anæsthetic quicker and more profound in action than cocaine. When used in eye work, accommodation is not paralysed.

For removing foreign bodies from the eye a drop of 1% solution almost immediately produces anæsthesia.

Butyn Sterules 1 and 2% 1 Cc. and TABLETS 1/6 grain (0·01 Gm.) are made. One of the latter in 1 Cc. of distilled water (*not* Normal Saline with which Butyn is *incompatible*) makes a 1% Solution.

Isotonic Solutions may be made with addition of Potassium Sulphate.

A ½% solution requires 1·34 Gm. in 100 Cc.	2% solution requires 0·97 Gm. in 100 Cc.
,, 1% ,, ,, 1·21 ,, ,,	5% ,, ,, 0·24 Gm. in 100 Cc.

The absence of dilatation of the pupil justifies its use in glaucoma as an analgesic in combination with Eserine or Pilocarpine. Operations on the muscles by infiltration with 0·5% solution.—W. M. Beaumont, L. ii./22,304.

In operative eye work 1 to 2% Butyn solution used. For profound anæsthesia 4% or 5%. Four applications at intervals of 2 minutes. 2%, applied topically, also suited for nose, ear and throat, *e.g.*, septum resection, tonsillectomy and adenoids. In dental work 10 drops or more of ½% solution, on opposite sides of the tooth to be extracted, with or without Adrenalin; allow one minute to elapse. For genito-urinary work 2% used.—W. M. Beaumont, B.M.J. i./23,57.

Butyn is quite as toxic as Cocaine and less efficient.—L. ii./23,1297. *Cf.* our p. 349. Possibly 'habit-forming.'—A. J. Copeland, B.M.J. ii/24,41.

ℙ**CODEINA** (*Off.*). U.S. Ph. Ned. Fr. Cx.

$C_{17}H_{18}(CH_3)NO_3,H_2O=317·282.$

Dose.—¼ to 2 grains (**0·016 to 0·12 Gm.**). (*Off.* ¼ to 1 grain), Fr. Cx. has *maximum single dose* ¾ grain, maximum during 24 hours 3 grains approximately. U.S. average ½ grain.

An alkaloid from opium or from morphine, in nearly colourless trimetric crystals. ***Soluble*** 1 in 130 of water (*Off.* is wrong), very soluble in diluted acids, in alcohol 90% 1 in 2, in chloroform and in excess of aqueous ammonia, but insoluble in excess of potash solution. It is a methylic ether of morphine—monomethyl-morphine.

Flavoring.—It has a slightly bitter taste, *vide* Morphine.

Uses.—In moderate doses is hypnotic and in small doses frequently it allays cough in phthisis. In diabetes beginning with a ¼ grain thrice daily it lessens the amount of sugar in the urine. A useful sedative in chronic cystitis with enlarged prostate.

For cough following catarrh ½ to 1 grain gives relief.—Tilley.

In tuberculosis relieves the night cough.—Dixon, Pr. XC., 1.

Diabetes insipidus under treatment with Codeine.—L. i./14,16.

℗**Codeine and Glycerin Jelly.** *Dose* —1 drachm=⅛ grain Codeine.

Codeine 72 grains, Citric Acid 720 grains, Refined Gelatin 6 ounces, Glycerin 36 ounces, Oil of Lemon 1 drachm, Balsam of Tolu and Distilled Water of each *q.s.* Make the Tolu water as ordered in B.P. for making syrup of tolu; of the liquor so prepared take 30 ounces; in 25 ounces of it soak the gelatin, heat till it is dissolved, and add the glycerin. In the remaining 5 ounces of liquor dissolve the Codeine and citric acid, add the solution to the above, add also the oil of lemon, stir well together, and pour into bottles to 'set.' Useful in chronic laryngitis, phthisical cough, &c. Also in ulcer of the stomach.

℗**Pastillus Codeinæ.** ⅛ grain in each.

ℙ**Pilula Codeinæ Composita.**

Codeine ¼ grain (increased to 2 grains if necessary), Extract of Nux Vomica ½ grain, Extract of Lettuce ¼ grain or more. To make one pill, to be taken two or three times a day, for diabetes.

Note.—Use Mucilage not syrup as excipient.

℗**Capsulæ Codeinæ et Valerianæ Compositæ** = **Pilula Codeinæ et Valerianæ Composita** in the Sixteenth Edition. The drugs are too deliquescent for a pill.

Dose.—One or more *p.d.* according to strength, Codeine $\frac{1}{3}$ to 1 grain, Valerian Extract 2 grains, Phenol 2 grains, Cascara Extract $1\frac{1}{2}$ grains. In glycosuria, Codeine is the most valuable drug for treatment. The Valerian acts as nerve sedative, the phenol as disinfectant for the intestinal canal.

The combination has been found helpful.—G. Rankin, B.M.J. i./13,597.

℗**Trochisci Codeinæ** contain $\frac{1}{8}$ grain (**0·008 Gm.**).

℗**Capsulæ Codeinæ cum Extracto Cannabis Indicæ.**

Codeine $\frac{1}{2}$ grain, Extract of Indian Hemp $\frac{1}{4}$ grain.

In neuralgia one every 4 or 5 hours.

ℙ**Codeinæ Hydrobromidum.** $C_{18}H_{21}NO_3HBr+2H_2O=416{\cdot}226$.

An anti-spasmodic similar in dose and use to the phosphate. For eye work has been advised to take the place of Ethyl-Morphine—being said to cause less pain.

ℙ**Codeinæ Hydrochloridum.**

$C_{18}H_{21}NO_3.HCl, 2H_2O=371{\cdot}766$.

Dose.—$\frac{1}{4}$ to 2 grains (**0·016 to 0·12 Gm.**). White crystalline powder, soluble 1 in 28·5.—D. C. Wilson, C.D., 1923, p. 560.

ℙ**Codeinæ Periodidum.** Apparent composition :—

$C_{17}H_{18}(CH_3)NO_3.2I=553{\cdot}106$.

Dose.—$\frac{1}{4}$ to $\frac{1}{2}$ grain (**0·016 to 0·03 Gm.**).

When made by the interaction of Codeine base and Iodine in suitable solvent (*cf.* Alkaloidal Periodides, p. 146) this compound is obtained as a yellowish-brown powder containing 54·1% Codeine.

The Periodide has been made in the writer's laboratories (1923). A considerable proportion (38·5% of the Periodide) of the contained alkaloid is liberated to Physiological Acid and a further marked proportion (11·6% of the Periodide) is yielded to Physiological Alkali when treated with it subsequently.

Solubility.—Slightly soluble in Chloroform, soluble in Alcohol, insoluble in Ether and water.

Incompatible with alkalis, and with salts of metals, and otherwise as alkaloids.

Pharmacology.

Doses of $\frac{1}{4}$ and $\frac{1}{2}$ grain were taken by two of the author's assistants (J.T.E. and C.C.B.). J.T.E. at the time was suffering from slight insomnia and a persistent cough. The effects of the $\frac{1}{2}$ grain dose in relieving both the insomnia and the cough were so gratifying that he continued for a week on the treatment, taking $\frac{1}{2}$ grain in capsule form each night.

Uses.—Suggested in moderate doses as hypnotic, in common with other Codeine compounds, also to allay irritating cough, especially of phthisis.

The antiseptic action of the Iodine it contains (45·9%) makes the compound a useful addition to therapy.

Dispensing Note.—To be given alone, finely powdered, in cachet or 'slipule' (No. 5) as required, preferably after a meal.

℞ **Codeinæ Phosphas** (*Off.*). U.S. P. Jap. Fr. Cx.
$C_{18}H_{21}NO_3.H_3PO_4,2H_2O=433{\cdot}322$.
Dose.—$\frac{1}{4}$ to 1 grain (**0·016 to 0·06 Gm.**). Fr. Cx. has max. during 24 hours 5 grains approximately. Slipule No. 5 for $\frac{1}{2}$ grain.
In granular snow-white crystals, soluble 1 in 4 of water. Contains 69·05% of anhydrous alkaloid (on salt+$2H_2O$), and is most suitable for hypodermic injection, 1 grain in 6 minims

Ⓟ **Syrupus Codeinæ Phosphatis** (*Off.*).
Dose.—$\frac{1}{2}$ to 2 drachms (**2 to 8 Cc.**).
Codeine Phosphate 0·5% in a solvent of Distilled Water and Syrup. (Slightly over 8% stronger than B.P. '98.)

Ⓟ **Tablets, Compressed, of Codeine Phosphate** $\frac{1}{4}$ and $\frac{1}{2}$ grain.

Ⓟ **Linctus Codeinæ, G.H.** *Dose.*—1 to 2 drachms.
Syrup of Codeine 1, Syrup of Virginian Prune, 1.
St. Th. H. has same strength of Codeine, but different vehicle.

Ⓟ **Syrupus Picis cum Codeina,** *v.* Pix Liquida.

℞ **Codeinæ Sulphas, U.S.** $(C_{18}H_{21}NO_3)_2H_2SO_4,\ 5H_2O = 786{\cdot}616$.
Average dose.—$\frac{1}{2}$ grain (**0·03 Gm.**).
Given with advantage in sciatica, also in *Morphine habit, q.v.*

℞ **Codeine-Methyl-Bromide.** *Syn.* Eucodeine.
$C_{17}H_{18}CH_3NO_3.CH_3Br=394{\cdot}215$.
Dose.—$\frac{3}{4}$ grain (**0·05 Gm.**). Is less toxic than codeine.

℞ **Apocodeinæ Hydrochloridum.** $C_{18}H_{19}NO_2.HCl=317{\cdot}718$.
Dose.—$\frac{1}{10}$, gradually increased to 1 grain (**0·006 to 0·06 Gm.**)
A greyish powder soluble in water.

Manufacture.—By heating codeine with a concentrated solution of zinc chloride.—U.S.D., 19th Edn., p. 378.
A good expectorant hypodermically. Solution must be neutral; dose up to 25 minims of 2% solution. Internally, 10 to 30 minims of 1% solution caused no nausea or vomiting, but produced free expectoration. In pill 3 or 4 grains daily may be safely given.
Uses.—Is a sialogogue and sedative and increases peristalsis. As ***Hypodermic Purgative,*** 30 minims of 1% solution = $\frac{1}{3}$ grain (**0·02 Gm.**), may purge in half an hour or less, but may also prove emetic.

COLCHICUM.

Syn. Meadow Saffron. Colchicum Autumnale. (*Liliaceæ*). Both **Corm** and **Seeds** are *Off.* and U.S. F.I. requires the seed for the preparations of Colchicum. The Corm is in U.S. with **not less** than 0·35% Colchicine. *Average dose.*—4 grains.
The seed U.S. has 0·45% Colchicine. *Dose.*—3 grains.

Ⓟ **Tinctura Colchici (Seminum)** (*Off.*). Now 1 in 10 Alcohol 70%, as required by F.I.=Fr. Cx. B.P '98 was 1 in 5 of alcohol 45%.
Dose.—5 to 15 minims (**0·3 to 1 Cc.**).
Fr. Cx.—Max. Single Dose—25 minims, and max. during 24 hours 100 minims approx.—and P. Belg. have this strength.

Ⓟ **Vinum Colchici** (*Off.*). 1 of Corm in 5 of Sherry.
Dose.—10 to 30 minims (**0·6 to 2 Cc.**).
Is given in mixtures with alkali and magnesium sulphate.

In gout controls the inflammation, 30 minims as first dose, then 15 minims, every three hours.

Flavoring.—It is not objectionable to the taste.

Ⓟ Liquor Antirheumaticus Compositus.

Dose.—30 minims (**2 Cc.**).

Colchicum Wine 15, Spirit of Æther 5, Camphor 2, Compound Tincture of Lavender to 30. A preparation used on these lines in Denmark contains Ammoniacum in addition.

Ⓟ Extractum Colchici (*Off.*). The inspissated juice of fresh Corms —as B.P. '98. *Dose.*—$\frac{1}{4}$ to 1 grain (**0·016 to 0·06 Gm.**).

U.S. is an alcoholic extractive washed with Benzine, evaporated, assayed and adjusted with Starch to contain 1·25 to 1·55% colchicine. Fr. Cx. extracts seeds with 70% alcohol, not standardised. Max. single dose $\frac{3}{4}$ grain, max. in 24 hours 3 grains approx.

Uses.—Removes the gouty swelling and congested state of joints by increasing the circulation, and so eliminating the obnoxious metabolic products of the disease. It may be given in pill with ipecacuanha and mercury.

To abolish the vomiting and diarrhœa often primarily produced (by increase of peristalsis) a small dose of atropine may be given with it.

Ⓟ Fluidextractum Colchici Seminis, U.S.

Dose.—3 minims. Standardised to 0·4% (average) Colchicine.

℞ Colchicina. Fr. Cx.

$$C_{15}H_9(O.CH_3)_3 \begin{cases} NH.CO.CH_3 \\ CO.OCH_3 \end{cases} = 399{\cdot}318.$$

Dose.—$\frac{1}{100}$ to $\frac{1}{32}$ grain (**0·0006 to 0·002 Gm.**) in a pill.

Fr. Cx. has *maximum single dose* $\frac{1}{32}$ grain; max. during 24 hours $\frac{1}{16}$ grain approximately.

This active principle is a yellowish crystalline powder, ***soluble*** in water (1 in 22 with neutral solution.—E. C. Davies and J. Grier, P.J. ii./22,210), readily in Alcohol 90% but less in absolute alcohol, very soluble in chloroform, slightly soluble in ether (1 in 155). It is a weak base, most of its salts being decomposed by water. Of use in acute gout, rheumatic gout, asthma, cerebral congestion, and uræmia.

Phosphotungstic Acid is useful for isolating the alkaloid.—Davies and Grier, *loc. cit.*

℞ Pilula Colchicinæ, Hyoscyami et Nucis Vomicæ.

Dose.—One every three or four hours.

Colchicine $\frac{1}{70}$ grain, Hyoscyamus Extract $\frac{1}{2}$ grain, Nux Vomica Extract $\frac{1}{4}$ grain, Sugar of Milk $\frac{1}{2}$ grain. Rapidly relieves gout.—A. P. Luff, B.M.J. i./14,635.

Toxic Action. Colchicum affects the gastro-intestinal membrane. It may cause pains in the bowels, vomiting, diarrhœa, intense thirst, and violent burning in the throat, œsophagus and stomach.

Colchicine 34 mgr. taken over a period of 19 days with 6 to 8 drachms of Laville's Liqueur caused paralysis. The palsy persisted for nearly a month. Even after 6 months not entirely cured.—B.M.J.E. i./15,19.

Antidotes.

Evacuate the stomach. Give water and demulcents—white of egg, oil, barley water. Apply heat to feet. Stimulants.

℗ **Colchicine Salicylate.**—*Syn.* **Colchi-sal.**

$C_{22}H_{25}NO_6.C_6H_4OH.COOH=537{\cdot}401$.

Dose.—$\frac{1}{60}$ grain **(0·001 Gm.)**.

A yellowish powder, ***soluble*** in water.

To prepare this salt mix Colchicine 20, with Salicylic Acid 7, moisten with water so as to combine and evaporate carefully.

℗ **Capsules of Colchicine Salicylate.**

Contain $\frac{1}{250}$ grain Colchicine dissolved in methyl salicylate. Used in rheumatism and gout. *Dose.*—One every two hours.

Gloriosa Superba (*q.v.*) contains Colchicine.

COLLODIUM.

Collodion (*Off.*).—*Syn.* Contractile Collodion.

A solution of Pyroxylin in an ether-alcohol mixture. Keep from naked light. Pure ether answers better. In preparing, solution is more rapid by adding the pyroxylin to the alcohol and afterwards the ether—as now used (*Off.*). **Acetone** is also a good inexpensive solvent, but the disadvantage is that the film is opaque. **U.S.** has Pyroxylin 4, Ether 75, Alcohol 25.

Fr. Cx.—Pyroxylin 5, 95% Alcohol 20, Ether (0·724 at 15°) 75.

Pyroxylin (dinitrocellulose $C_6H_8(NO_2)_2O_5=252{\cdot}11$) is prepared by the action of nitric and sulphuric acids on cotton. It is freely soluble in Methyl Alcohol, Acetone, Amyl Acetate, Glacial Acetic Acid, and Ether mixed with an equal volume of either Ethyl or Methyl Alcohol. In making **gun-cotton** (trinitro-cellulose) $C_6H_7(NO_2)_3O_5=297{\cdot}11$ the mixture of acids contains a larger proportion of nitric acid and the time of action is longer. This body is insoluble in a mixture of Alcohol and Ether.

Pyroxylinum, U.S. gives double the molecular formula—

$C_{12}H_{16}(ONO_2)_4O_6=504{\cdot}22$.

Some comparative experiments which we conducted with a view to improving on '**Collodion**' gave the following:—

Collodium Aceto-Æthericum.—Pyroxylin 5, Acetic Ether *q.s.* to 100. The odour is a slight objection, otherwise the best substitute so far found. Does not pucker the skin anything like so much as the B P. preparation. Is simple in making. Consistence excellent.

Is not more irritating in use than Collodion (*Off.*). Adheres closely and is transparent.

Collodium Acetonum B.P.C.—Pyroxylin 5, Clove Oil 2, Amyl Acetate 25, Benzol 20, Acetone to 100. U.C.H. adopts this. Another formula: Pyroxylin 5, Camphor 1 dissolve in Acetone 90, and make up to 100. Evaporates more slowly than ordinary collodion, but makes stronger film.

℗ **Anodyne Colloid.**—*Syn.* Amyl Colloid.

Amyl Hydride ½ ounce, Absolute Alcohol ½ ounce, Aconitine 1 grain, Veratrine 6 grains, Collodion to 2 ounces.

For neuralgia, sciatica, lumbago, all muscular pains, &c. The amyl by its rapid volatilization often produces almost instantaneously the desired result; but should the pain continue the alkaloids can be brought into activity by applying a piece of moist spongio-piline over the collodion film.

✱ **Celloidin,** (T.M. 14460). Pyroxylin purified by solution in alcohol and ether (in which it is again soluble). Is used to im-

bed microscopical specimens and in surgery to close wounds. A solution in acetone is called Filmogen. **Photoxylin** is similar.

✱ *Note.* —**'Celloidin Collodium'** is also a Trade Mark (No 14461).

Celloidin Solution.

Celloidin 1, Methylated Ether Sp. Gr. 0·720, 3½, Absolute Alcohol 3½, all by weight.

Rubber Glove Substitute.

Celloidin 5, Ether 48, Alcohol 46½, Castor Oil ½. Dip the hands in the solution—it soon dries, and forms a flexible covering.

To remove, wash with equal parts of alcohol and ether.

'New Skin' is a somewhat similar preparation.

Collodium cum Oleo Crotonis.

Croton oil 1 part mixed with 7 parts, more or less as required, of Flexible Collodion, forms a useful counter-irritant; a thin layer painted on quickly dries and its action is limited to the spot to which it is applied.

Collodium Flexile (*Off.*).

Contractile Collodion with addition of a small proportion of Canada Turpentine and Castor Oil, makes a more elastic film than Contractile Collodion, U.S. is similar.

Pyroxylin dissolved in acetic ether adheres closely and is pliable. See our experiments under Collodion.

Collodium Elasticum, P. Austr., Ph. Ned. Collodion 98, Castor Oil 2. Fr. Cx. has Collodion (Fr. Cx. *q.v.*) 95, Castor Oil 5.

Collodium Benzoini.—*Syn.* Kelly's Paint.

Add Compound Tincture of Benzoin 3 to Collodion 1, shake until mixed and add Glycerin 1. Keep well corked and shake before use.

As an antiseptic covering to slight wounds. It dries slower than ordinary collodion, but gives a harder film. Used in New York.

Collodium Iodi. Iodine 1 (more or less if required) to 15 Flexible Collodion, sustains the action of the iodine and the film protects the part. Recommended for ringworm, alopecia, chilblains and frostbite.

Collodium Salicylicum.

Salicylic Acid 1, Flexible Collodion (¾ strength) 5. For use on exposed parts like the next preparation.

In skin diseases, Salicylic Acid 1 drachm in 8 said to have amazing results in chilblains, and to be useful in many dry dermatoses. Remarkable results in acute dermatitis, eczema, etc., with ointment of equal parts of Salicylic Acid and Vaseline.—Sir G. A. Reid, Clin. Jl. Dec. 26/23,617.

Collodium Callosum.

Salicylic Acid 8, Extract of Indian Hemp 1, Flexible Collodion (¾ strength) 60. A rapid and painless solvent for corns and warts.

Collodium Acidi Salicylici, L.H. is similar. St. Bart.'s H. adds Zinc Chloride 20 grains to the ounce.

Collodium Salicylicum cum Zinci Chlorido.

Salicylic Acid 2, Zinc Chloride 1 Collodion 15. Forms a clear solution. This and the above have proved useful in epithelioma.

℗ **Mercuric Chloride** to the extent of 1 in 30 or more of Salicylic Collodion may be used to warts.

Collodium Salicylicum et Lacticum.

Salicylic and Lactic Acids, of each 10, Collodion 80. Lactic Acid, being destructive to morbid growths, is said to increase its efficacy.

Collodium Stypticum.—*Syn.* **Styptic Colloid.**

Absolute Alcohol 16, Benzoin 1½. Dissolve, filter, and add Tannic Acid 16, Gun Cotton 1½, Purified Ether to 100. Mix, set aside three days, and decant. Useful in checking various forms of hæmorrhage when it can be brought in contact with the bleeding surface.

Camphoid, a substitute for Collodion.

A solution, 1 in 40, of pyroxylin, in a 33% solution of camphor in absolute alcohol made by weight. May be used as a vehicle for the application to the skin of such drugs as iodoform, phenol, salicylic acid, resorcin, iodine, chrysarobin, and ichthyol. Iodoform dissolves in it to the extent of 1 in 10. The preparation dries in a few minutes, leaving a film, which is not easily washed off.

Celluloid. Made by dissolving Pyroxylin 50 in a solution of Camphor 25 in ether 100 and manipulating the mass until it has become plastic. It is then dried. Colours may be incorporated.

It is supplied in thin sheets and being light, rigid and washable, is useful in surgery for splinting; it is rendered plastic by rolling up and macerating in hot spirit for a few minutes; it may then be wrapped round the limb with a layer of wool outside and quickly sets. N.B —Very inflammable. Celluloid was originally called **Xylonite.**

Soluble according to our work more readily in Acetone than in Amyl Acetate, but the film resulting in the first case is liable to be opaque. Mixtures of these solvents are sometimes used. A collodion can be readily made strength 1 in 20 using equal parts of the solvents. (The celluloid should be shredded).

Celluloid Splints made by coating a layer of stockinette, previously spread over the 'model,' with a 10% Solution of Celluloid in a solvent such as Acetone several times. The model is made by pouring a semi-liquid mixture of Plaster of Paris and water into the well oiled cast and leaving it to set. Pieces of gauze appropriate to the model are also used and incorporated with the Celluloidal layers. After setting cut down with a sharp knife.—J. Wicliffe Peck, P.J i./13,5.

Acute polyomyelitis treated with Celluloid Splints (formula given)—L. i./14,216.

Perforated Celluloid 0·15 Mm. thick rendered softer by soaking in 5% Carbolic Lotion, placed next to a wound where there has been much loss of skin with the usual dressing above; relieves the pain of redressing. Thicker suitable for making splints.—S. R. Douglas, L. ii./16,558.

Celluloid Plates in Plastic Surgery placed beneath deep cicatrices without causing irritation, also celluloid solution in acetone successful also a secret preparation. The solutions found preferable.—C. Higgens, L. i./16,643

Celluloid 5% in Acetone excellent adhesive for use in applying traction.—B.M.J. ii./18,376.

Pexuloid.—A special solution to produce light strong non-inflammable celluloid splints. The method is similar to the above the whole being finished with a special splint varnish. As used at the Hospital for Sick Children, Great Ormond Street, London.

COLLOIDAL METALS.

Certain Metals and Metalloids in the form of Colloidal Solutions have latterly been considerably used in therapeutics. We have arranged our account of the subject under the following headings :—

A. **General Characters.**

B. **Verification of the Colloidal Condition.**

C. **Manufacture,** methods of (previously published). (1) by Chemical Methods, (2) by Electrical,—Bredig's and numerous other Processes.

D. **Patents** governing Manufacture.—(1) Chemical, (2) Electrical.

E. Our experiences in the **Manufacture of Colloidal Metal Solutions,** together with details of **Physiological Experiments** which we have had conducted, and the **Therapeutic Uses** and **Dosage** of Colloidal Metals of Commerce, (1) Chemically produced, (2) Electrically produced.

F. **Antiseptic Powers** of Colloidal Metal Solutions.

G. **Metal Organosols.**

H. **General References**

Interspersed under the various headings we have placed brief abstracts, notably to the Jl. of Chemical Society's Abstracts of the very considerable literature of the subject dealing with the Chemistry and Physics of Colloids.

A. General Characters.

Thomas Graham devised the term **Colloidal** (from Κολλα= glue) to distinguish between the amorphous substances in solution, which diffuse with difficulty, and the **Crystalloid** substances, *i.e.*, those crystallising easily from Solutions and which diffuse quickly from their solutions into a water stratum, or which pass with ease through membranes, *e.g.*, those employed in the process known as dialysis. Glue and Gelatin are typical examples of Colloidal substances,—they do not exhibit the property of diffusion in this manner.

This differentiation is however no longer held. The view is that colloids and crystalloids are not different kinds but rather different states of matter, the same chemical substance being obtainable in one state or the other according to how it is made. Many substances which might be regarded as typical crystalloids have been produced in the colloidal condition. For theoretical study see 'Chemistry of Colloids and some Technical Applications.'—W. W. Taylor, 1915 (E. Arnold).

The real characteristic of the colloidal state is that the particles are large enough to possess the properties of surface.

It appears that in 1846 Selmi applied the term 'pseudo-solutions' to Colloidal Solutions and recognised their characteristics.—Guareschi, J.C.S.A. ii./11,261.

It is pointed out that the distinguishing feature between Crystalloids and Colloids, viz., diffusibility or non-diffusibility, through a membrane, is not characteristic of a substance in all its solutions, for example, in water Sodium Chloride is in true solution, whilst in dry Benzole it is in a colloid state.—P.J. i./14,109.

Certain other liquids, *e.g.*, Alcohol, Glycerin and even Sulphuric Acid in addition to water have the property of producing Colloidal Solutions. Broadly speaking, these Solutions are merely suspensions of minute particles of the Colloidal substance uniformly distributed, so that the suspension appears homogeneous to the naked eye. Homogeneity is, however, not seen by the microscope and the Solutions are therefore called micro-heterogeneous.

The two constituents of a Colloidal Solution are called 'phases.' The phase consisting of isolated particles is known as the '*disperse*,' or '*internal phase*,' whereas the medium in which they are suspended

is termed the '*continuous*' or '*external phase.*' In some instances the '*disperse phase*' may be of the nature of a fibrous frame, *e.g.*, like a sponge or mesh-work, through which the *continuous* medium permeates.

Suspensoid is the name given to that class of colloid, the particles of which consist of pure solid. Those in which the disperse phase contains water belong to the emulsoids.

Inbibition is the term applied to the taking up of water by a colloidal system, such as an emulsoid. Heat is liberated in the process and the water is compressed.

Colloids dispersed in solution usually show a contraction in volume corresponding to quantity, in other words the density cannot be obtained by calculation.

The *Osmotic pressure* of most Colloidal Solutions is very small, exceptions being those colloids which are salts of an inorganic base or acid such as Na or Cl respectively, combined with a large organic ion as the anion or cation. Examples: Soaps and dyes like night-blue.—Bayliss.

The particles of the 'disperse phase' show '*Brownian*' *Movement.* Those the diameter of which exceed 3 to 5 μ do not show it.

'Brownian' movement is due to the perpetual movement of the molecules of the liquid, and to their possession of mass and, therefore, kinetic energy. The colloidal particles are continually being hit by these molecules and their movement is thus maintained.

The reticular structure, described as present in living protoplasm, is undoubtedly due to inadequate methods of illumination. Living cells appear to contain colloidal solution with the particles in 'Brownian' movement.

The *optical property* of a Colloidal Solution is usually that of dichroism, *i.e.*, transparency by transmitted light and relative opacity by reflected light.

Electrical Properties.—The disperse particles are charged with + or — electricity.

In water, amongst the + charged are the Metallic Hydroxides, Silicic Acid and Basic Dyes, *e.g.*, Methyl Violet, Methylene Blue and Magdala Red in Water. Amongst the — charged are all the Metals, Metallic Sulphides, and certain Dyes such as Indigo, Eosin, Fuchsin, also Mastich, Gamboge and Starch.

On passing an electric current into a Colloidal Solution the + charged particles move towards the cathode and the — towards the anode.

The neutralisation of electric charges in colloidal solutions is distinct from changes of solubility due to the formation of chemical compounds with the ions of the salts added, as is evidenced by the trivalent Lanthanum salts, which are effective in small concentration.—Bayliss.

Some Colloidal Solutions show the property of coagulation or precipitation when submitted to heat, or by mechanical means—or they may be transformed into jellies—the insoluble body being

called a 'gel' (Graham designated Colloidal substances in liquid form 'Sols' and in jelly form 'Gels.')

A 'gel' may mean the coagulated or precipitated form of any colloid, suspensoid or emulsoid, or it may refer to the state of a solution of Gelatin when cold. The precise structure of a "solid solution" of Gelatin does not appear to be clear.

On coagulation the substances may be either 'reversible' *e.g.*, Aqueous Solutions of Gelatin, Glue, Gum, or 'irreversible' to the original form, *e.g.*, Ferric Oxide, Alumina, Gold, Silver, Platinum. The Inorganic Colloids are mostly irreversible and are precipitated by very small amounts of some Salts, while large amounts of other Salts have no effect. The reversible includes mainly the Organic Colloids—these are not so sensitive to the coagulating action of the electrolytes.

The precipitation of colloids, due to electrolytes, varies with each electrolyte used, depending on the concentration of the uni- bi- or tri-valent ions.

The concentration of a particular ion required to deprive colloidal particles of their electric charge is called the *isoelectric point* of that solution. The H ion is frequently intended but should be so stated. The *isoelectric point* of hæmoglobin is said to be $10^{-6\cdot8}$.—Bayliss.

All metallic Colloidal Solutions require *protection* by some Organic Colloid such as Gelatin, Albumin, etc. *Unprotected electrically prepared Colloids are so unstable that they would probably have to be freshly prepared for use every day.*

The presence of protectives, unless controlled, and information given of the protective present, renders reports of therapeutic action of no value, as, for, instance, when Peptone or Silicic Acid is used. Their action in preventing the precipitation of suspensoid colloids is probably due to the deposition of a layer of emulsoid on the surface of the particles. The majority of metallic colloids may remain stable for some time in the absence of a protective.

The addition of Sodium Chloride, to render a solution for medicinal use isotonic with blood, according to Bayliss, is unnecessary, as the amount of colloidal solution injected is usually small, and should be given at a slow rate.

R. Zsigmondy expresses the protective effect of different substances by the 'gold value,' *i.e.*, the number of milligrammes of a Colloid which are just capable of protecting 10 Cc. of a Gold Solution containing 0·0053 to 0·0058% of Gold from coagulation by 1 Cc. of a Sodium Chloride Solution containing 100 Gm. of Salt in 900 Cc. of Water.

Gelatin and Glue	have a gold value 0·005 to 0·01.
Egg Albumen and Gum Arabic	,, ,, ,, 0·1 to 0·25.
Dextrin	,, ,, ,, 6 to 20.
Potato Starch	,, ,, ,, about 25.

NOTE.—The reader should not misunderstand these figures; the Gelatin has the greatest protective power and Starch the least.

Regarding the size of the particles in Colloidal Solutions, V. Pöschl classifies their magnitude as from 20 $\mu\,\mu$. to 0·1 $\mu.\mu$. Above the former one may speak of mechanical suspensions. The latter figure

is approximately the extreme limit of divisibility. It is, according to this authority, the upper limit to the absolute size of molecules.

A molecule of chloroform is stated to have the size of 0·8 μ. μ.

Particles in colloidal gold solutions vary from 6—15 μ. μ.

Relationship of colour of Colloidal Solutions and size of the particles (gold, silver, platinum, mercury, copper, etc.).—W. Ostwald, J.C.S.A. ii./11,868 *see also* ii./12,240.

Colloidal metals were recently called by the somewhat imaginary names **'metallic ferments'** or **'artificial enzymes.'** The reason of this is that the natural enzymes are all colloidal bodies—the natural enzymes are heterogeneous catalysts having the power of inducing chemical changes in other bodies without themselves becoming altered. The hydrosols of several of the metals (Platinum for example) under discussion have this catalytic property which resembles enzyme action in many respects, hence the analogy.—B.M.J. i./12,252, *et seq.*

For particulars of adsorption see Vol. II.

Amongst bodies known in **both Colloidal and Crystalloidal conditions** may be mentioned:—

I. Inorganic Substances:—

(1). **Elements.**—

(*a*) Metals:—Light Metals—Potassium, Sodium, Lithium, Barium, Strontium, Calcium, Magnesium, Aluminium; all the common heavy metals.

(*b*) Metalloids:—Carbon (?), Phosphorus, Sulphur, Selenium, Silicon, Boron.

(2) **Sulphides**—of all the common heavy metals.

(3) **Oxides and Hydroxides.**—Phosphoric Acid and Oxides of heavy metals.

(4) **Salts.**—*e.g.*, Sodium Chloride, Sodium Carbonate, Mercurous Chloride

II. Organic Compounds:—

Alkali Salts of Palmitic, Oleic, etc., Acids.

Egg Albumen.

Substances known in the Colloid state only.

I. Inorganic Substances:—

(1) Hydroxides of Magnesium, Aluminium, Thorium, Manganese, Bismuth Copper, Iron, Gold, etc.

2) Certain Salts and Compounds, *e.g.*, Copper Ferrocyanide, Berlin Blue Molybdenum Blue.

II. Organic Substances:—

Varieties of Starch, Dextrin, Inulin, Tannins, Caoutchouc, Resins, etc. Glue, Isinglass) Agar Agar.

B.—Verification of the Colloidal Condition.

With regard to the *examination* of a Colloid Solution there are varying identifying characters. (1). Naked eye examination (already mentioned)—dichroism; further there is fluorescence (especially characteristic of many Hydrosols). (2). Appearance on examination with the ultramicroscope. (3). Indiffusibility. (4). Stability at higher temperatures. (5). Instability in presence of certain electrolytes—alteration by these is a permanent characteristic of Sols. If stable, protective Colloid is probably present.

The following points should be noted:—

(1) In the ultramicroscopic method care must be taken to examine the solution in a state of dilution comparable with that of a solution known to

have all the particular compound present in the colloidal state. Certain commercial preparations, though showing particles with the ultramicroscope, have been found to contain nearly all the matter present in true solution, and diffusible through parchment.

(2) Extent of true solubility of the substance in the liquid must be taken into account. Thus, Iodine is soluble in water 1 in 5,000, and in a colloidal preparation it would therefore be suspended in a saturated solution. The so-called ' solutions ' of Iodine in Oil would, of course, contain a larger amount in true solution. In fact, in many commercial preparations it has been found that the activity is equivalent to the fraction present in true solution.—Bayliss.

Fractional Diffusion as a means of ascertaining uniformity of fine suspension or homogeneity of Colloidal Solutions. Diffusiometer for.—J.C.S.A. ii./12,1146.

Tests of Colloidal Sols.—Examination of Colloidal Sols with the ultramicroscope or with 1/12th inch oil immersion and an 8 c. Leitz eye piece, using a specially good dark ground illumination showed marked difference in amount of movement of various preparations.

Colloidal Sols must also show the "**Tyndall Effect**"—*i.e.*, when placed in a test cell made of optical glass and subjected to action of a powerful beam of parallel light they show the characteristic turbidity.—A. B. Searle, Pres., June, 1920, p. 235.

For a further consideration of the subject from the theoretic aspect, R Zsigmondy's ' Colloids and the Ultramicroscope '—English translation by J. Alexander—(Chapman & Hall)—should be consulted The nomenclature of the subject, which we have briefly given, is the same as employed in the last-mentioned work. The book deals largely with the size of the particles in Colloidal Solutions, *e.g.*, of Gold, Platinum, Palladium, etc., and their motion in the medium.

C.—Methods of manufacture previously published.

1.—Chemical Methods.

Aluminium Hydroxide Hydrosol was first made by W. Crum with a freshly prepared Neutral Aluminium Acetate as starting point (for details *v.* V. Pöschl).*

Aluminium Hydroxide Colloid intravenously produces death in animals but Calcium Chloride added prevents it—J.E.R.McDonagh, B.M.J. i/17, 565.

Arsenic.—A solution of Arsenic Chloride in Absolute Alcohol at −15° C. added to a Solution of Hypophosphorous Acid in the same solvent at −15° C. gives a brown precipitate which contains 68·2% Arsenic and 0·97% Phosphorus and gives a Colloidal Solution in dilute Alkali Solutions.—J.C.S.A. ii./07,948.

Bismuth.—Bismuth Hydrosol is obtained by reducing dilute Ammoniacal Solutions of Bismuth with Stannous Chloride.

Copper.—The method given by V. Pöschl produces a reddish brown Hydrosol with Water, but it is unstable.

Gold.—R. Zsigmondy gives details for reduction of Gold Chloride Solution with Potassium Carbonate or Bicarbonate.

Ferric Hydroxide Hydrosol was made by L. Péan de Saint-Gilles by prolonged boiling of a solution of Ferric Acetate. Acetic Acid is driven off—it is a process of hydrolysis.

Details of the process are given by Pöschl.

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* The Chemistry of Colloids, by Victor Pöschl, English Translation by H. H. Hodgson, C. Griffin & Co., 1910—a useful compendium of the early work. We acknowledge having made numerous abstracts from this book in the introductory portion of this Chapter.

Manganese Hydrate Hydrosol was made by reducing Potassium Permanganate and washing the precipitate with water. After several decantations a dark brown Hydrosol forms.

Mercury.—A. Lottermoser uses Stannous Chloride or Stannous Nitrate for reducing Mercurous Nitrate (dilute Solution).

Platinum Group of Metals.—Lottermoser made a **Hydrosol of Platinum** by a method similar to that used by Zsigmondy for the preparation of gold Hydrosol. By previous dilution and subsequent dialysis a stable Hydrosol was obtained. **Hydrosols of Palladium, Rhodium** and **Iridium** were made likewise—the two latter are, however, unstable.

Selenium.—According to work of H. Schulze Selenium Hydrosol is obtained by reducing Selenic Acid (SeO_2) with a 7 to 8% Solution of Sulphur dioxide and cooling. Add excess of Ammonia and then neutralise the excess with Oxalic Acid. Centrifugalise the liquid —this separates the Colloidal Selenium from the medium. On dissolving it in water this produces a Colloidal Solution.

The Solution is coagulated by Potassium Chloride, Potassium Sulphate and Sodium Carbonate, not by Acetic, Tartaric or Oxalic Acids or Ammonia.

Silicic Acid (Soluble).—A typical example of the early work in Colloidal Chemistry.—For details V. Pöschl's, or other textbook may be consulted. Graham produced a Hydrosol of Silicic Acid.

Silver.—Carey Lea was the first to definitely discover Silver Hydrosol. A. J. A. Prange in 1890 made an even purer Silver Hydrosol. The most concentrated solution made by him contained 4·75 Gm. of Silver per litre. It rapidly deposits a black precipitate. We give a modified Carey Lea method in the experimental work which has yielded us good results.

Solutions of Hydrazine Hydrate (1 in 2,000), Hydroxylamine Hydrochloride, and Hypophosphorous Acid have also been used as reducing agents for Silver.

Pyrogallol method.

Silver Nitrate 3·58 Gm. in dry Pyridine 50 Cc. is treated with 25 Cc. of a solution of Pyrogallol containing 0·57 Gm. in the same solvent. The slightly yellow solution formed on diluting with water yields a Colloidal Silver Solution. Solutions containing 0·05 Gm. of Silver per 100 Cc. of liquid are fairly stable, and by centrifugalisation the greater part of the Colloid can be separated from them. Using Tannic Acid instead of Pyrogallol, the result is similar. Solutions of Copper Sulphate act similarly.—A. Pieroni (Gazzeta, 1913,43, i. 197—200), ex J.C.S.A. ii/13.393.

Sulphur.—According to M. Raffo [Koll. Zeit. ii., 358 (1908)] this is made by pouring a concentrated solution of Sodium Thiosulphate drop by drop into cold Concentrated Sulphuric Acid (Sp. Gr. = 1·84). The Sulphur Hydrosol throws out Amorphous Sulphur in a few hours—this changes in time to Crystalline Sulphur.

Trillet's Method was to precipitate solutions of Metallic Salts with an alkali in presence of *Albumen*—forming types of Colloidal Solutions of the Metals—called Oxydases of the Metals. These *Alkaline* Solutions were found by Robin and Bardet to produce necrosis (as might be expected) in the tissues, and hence were

abandoned for therapeutic purposes.—T. Stephenson, Pres., May, 1912. The process can, however, be so modified that the resultant (dialysed) product is not alkaline.—W. H. M.

2.—Electrical Methods

The disruption by the electric arc of metals into fine powder and to form dark liquids by employing terminals of the metal required has been in particular (of recent times) investigated by G. Bredig (1898). A direct current arc is used. The strength of current is 5 to 10 ampères. E.M.F. between 30 and 110 volts. Gold, Platinum, Palladium, Iridium and Silver Sols were made on these lines. Bredig showed that the cathode is the chief participant in the disruption.

Mollinari's Chemistry, Vol. I., 1912, p. 103–105, gives the following brief details of **Bredig's Process** for making a Hydrosol of Gold.

A current of 8 to 10 ampères at 100 volts passes through two gold wires 2 centimetres beneath the surface of 100 Cc. of Water (purest distilled), containing a trace of Sodium Hydrate, so as to produce an electric arc. The ends of the wires are 1 to 2 mm. apart.

Theo. Svedberg and others have improved upon Bredig's process. Of the non-metals, Carbon, Silicon, Selenium and Tellurium were made in colloidal condition by the method.

Stable Colloidal Solutions may be made by electrolysing 5% Gelatin Solution containing 1% Sodium Chloride or Sodium Sulphate (to render slightly conductive) between metallic electrodes. The anode is in a glass vessel containing the Solution whilst the cathode composed of the metal to be made Colloidal is enclosed in an inner porous cell. Use continuous current, 3 to 5 ampères at 120 volts. Colloidal Solution forms in 10 minutes in neighbourhood of the anode. The liquid surrounding the cathode is free from metal. Gold Sol in this way containing 42 mgr. of Gold per litre was made. Silver 87 mgr. per litre, in one case 3·2 Gm. in 448 Cc. The Gelatin is decomposed partly, forming Protalbinic and Lysalbinic Acids.—C. Serono, J.C.S.A. ii./10,776.

Pure elemental **Arsenic** is best made by electrolysing an Alkaline Solution using Arsenic as anode, or better by electrolytic reduction of a solution of Arsenious Oxide 3 Gm. in a litre of 0·3% Sodium Hydroxide using a current of 2 to 3 amp. and 100 volts, a Platinum Cathode and Mercury Anode. Cool the solution during electrolysis and purify by dialysis. The addition of a trace of gum is useful for keeping. A solution made this way contained 0·07% Arsenic.—Lecoq (Compt. rend., 1910,150,700), J.C.S.A., 1910, ii./406.

High-frequency alternating currents passing between electrodes of the metal immersed in water have been used in a new method of preparing aqueous colloidal solutions of metals. Varying the range of frequency of the current between wide limits, it was found that the *colour* supposed to be *characteristic of the Colloidal Solutions of metals is a result of the special conditions of the discharge.*

Thus gold, on altering the frequency, can be made to give a red, blue or purple solution; in the red solution the particles are nega-

tively charged and in the blue solution positively charged. The purple solutions contain both kinds of particles. The red solution is converted into the blue by the action of an electrolyte or electric field.—H. Morris-Airey and J. H. Long, Proceedings of the University of Durham Scientific Society (vol. V., part ii., pp. 68 and 113) per Na., Jan. 1/14. See also J.C.S.A. ii./13, 1033.

For a complete study of all the methods of making Colloidal Solutions of Inorganic Substances, The Svedburg—"Die Methoden zur Darstellung Kolloider Lösungen Anorganischer Stoffe"—should be consulted.

D. Manufacture of Colloids, Patents for—

(1) Chemical—

British Patent No. 21,521/11 (H. CROOKES). Solutions of Peptone, Gelatin, Dextrin, or Meat Extract are used as vehicles for the preparation of Colloids. They are sterilised by boiling and contain varying proportions of Sodium Chloride. Solutions of Salts are then added, *e.g.*, Silver Chloride or Bromide, Mercury Bicyanide or Perchloride, Arsenious Acid and Salts of Thorium and Cobalt are mentioned as having strong germicidal action; and salts of Bismuth, Lead, Nickel, Iron and Aluminium as being weak germicides. The following is given as an example for the preparation of Colloidal Silver :—

Peptone 300 grains and Salt 800 grains are dissolved in 40 ounces of water. Silver Nitrate 27·59 grains are dissolved in another 40 ounces of water, and added to the Peptone Solution. The whole is heated in a hot air oven for 48 hours at 100° C., and then filtered from the precipitate.

British Patent No. 28,776/1912, H. CROOKES. To a solution of Peptone or like body, with or without the addition of Salt, a 0·1% Solution of the desired metal is added, then 0·01 to 0·1% of Phenol, and the whole boiled, *e.g.*, Silver Nitrate 27·59 grains, Water 40 ounces. Dissolve and add to a solution of Peptone 300 grains in 40 ounces of water, then add the Phenol and boil. Only 150 grains of Peptone are necessary in the preparation of Colloidal Iron.

Another example mentions Copper Nitrate with Peptone and Arsenate of Soda or dilute Potassium Iodide Solution instead of the Arsenic for the preparation of Colloidal Copper. The Peptone is said to be sufficient to reduce the metals without the use of Sodium Chloride. The Phenol prevents the Colloids from breaking down.

German Patent.—Chem. Fab. Von Heyden, D.R.P. 202,561.

Reduction of an alkaline solution (NaOH) of Arsenic in presence of egg albumen, gelatin, etc., by alkaline Pyrogallol. The solution is dialysed or precipitated by acid, washed and again dissolved in water. May also be precipitated by Acetone, Alcohol or a mixture of the latter with Ether.—J.C.S.A., 1909, ii./310.

British Patent No. 1219/1912 (A. DERING). **Preparation of Colloidal Mercury** by heating Mercuric Chloride in oils such as poppy, linseed, and the like containing Triglycerides. 5 parts of Mercuric Chloride heated with 100 parts Poppy Oil 20 minutes on open flame. The oil then dissolved in Ether washed with water, dried and freed from Ether. The oil thus produced may be used for medicinal purposes, *e.g.*, treatment of syphilis.

Colloidal Sulphur No. 7238/1913. Patented process by introducing Sulphur Dioxide and H_2S into dilute HCl. The bodies interact, forming Sulphur and Water; the former remains colloidal.—P.J. ii./13,216.

(2) Electrical—

British Patents Nos. 14,369/1912 and 24,666/1912 relate to the separation of one Colloid (*e.g.*, a metal) from another, to which it is adsorded by electrosmosis. Taking advantage of the difference in sign or potential of the charge in each, a diaphragm having the same sign or being indifferent to the pole may be used so that only the desired Colloid passes through. Also the pole may be isolated with another diaphragm in order to prevent decomposition of the ions of the desired body.

British Patent No. 29,049/1912 (Gesellschaft für Elektrosmose) describes the preparation of Colloids as follows :—To a Colloidal Solution of Albumin, Aluminium Hydrate, Carborundum, or Silica, one adds a solution of the desired metal and reduces it by means of Formaldehyde. It is then separated by electrosmosis.

Colloidal preparations of Commerce examined and analysed and several found far below the strength stated, and the Iodine in one is not in colloidal form at all.—A. J. Clark, B.M.J. i./23,273.

E. Our Experience in Manufacture of these bodies, together with details of the Colloidal Metals of Commerce and their Therapy.

A study of the literature brings out one point conclusively, namely, that the keeping properties of simple Hydrosols are by no means marked. Therapeutic agents of so tedious a nature to prepare as are some of these Colloids—which will not remain in their primary condition for more than a few weeks, are inconvenient for general treatment. The requisite presence of a 'protective substance' renders these Solutions distinctly indefinite. We believe, in fact, that some of these Colloidal Solutions contain *Compounds of the metals with protein decomposition products, i.e.*, Metals combined as Organic Salts. In the true Colloidal Solutions Gelatin or some other form of protective is a *sine qua non.*

Gelatin 3% and Glucose 5% found best for protection of suspension colloids.—J. E. R. McDonagh, B.M.J. i./17,565.

Therapy in General.—

The particles in a Metallic Hydrosol should be in the finest possible subdivision.

These Hydrosols are in general well tolerated. Physiological trials which we have had conducted support this. A metal, *e.g.*, Copper in fine particles would probably not be absorbed to any extent, excepting by cumulative action and ultimate assimilation. The conditions would be otherwise in the case of a reactive organic compound of Copper. Injected hypodermically or intravenously it is conceivable that the minute particles of a Colloid Metal may be reactive. Though relatively non-toxic, clearly reasonable precautions should be taken to avoid excess in treatment.

The Colloid Solutions are stated to have marked bactericidal action *in vivo* ; this is, on the one hand, due to their direct action (as shown by experiments *in vitro*) and on the other by the phagocytosis which they bring about when injected into tissues. (We deal with the subject of antiseptic power subsequently—purely *in vitro* it is comparatively slight, *e.g.*, on *B. Coli.*)

It appears that as the therapeutic effect is based on the leucocytosis which all these bodies produce, the actual *kind* of metal used is of less importance. B. G. Duhamel, L. i./12,90, thinks the reason for all the Colloidal Metals having similar effect is due to their being *physically* similar as distinct from their chemical nature. It has been held (P.J. i./14,513), that the first effect on injection of a colloidal metal is to cause hypoleucocytosis then an increase in leucocytes and a stimulation of the phagocytic power of these cells. **Colloidal silver** is specially favourable to the phagocytosis of *B. Coli* and *B. typhosus*, but has no effect on the phagocytosis of *B. pyocyaneus.* **Colloidal gold** stimulates the phagocytosis of the latter organism. **Colloidal Mercury** favours phagocytosis of *B. typhosus* and *Staphylococci*, but not *B. Coli* or *B. Pyocyaneus.* There is no parallelism between the antiseptic power and their influence on phagocytosis.

It is stated furthermore (T. Stephenson, Pres., May, 1912), that the injections of electrically made Solutions cause *reduction of temperature*, increased excretion of urea and uric acid—hence Robin has produced good results with their use in pneumonia, articular rheumatism, etc.

'THE COLLOIDAL STATE IN ITS MEDICAL AND PHYSIOLOGICAL ASPECTS,' by Sir W. M. Bayliss, should be consulted. It is here shown that when a drug is prepared in the colloidal state it does not necessarily acquire any special therapeutic qualities.—B.M.J. i./23,193.

Preparations made electrically would be preferable except that they are apt to deposit on keeping, on account of the difficulty of keeping all foreign electrolytes out of the solution.

The fact that colloids are in the same physical state as some of the body constituents is of no significance.

Many, e.g., Sugar, Calcium and, above all, Oxygen, are not in colloidal form. No good evidence has been produced that the chemical or pharmacological action of colloids differs from that of bodies in true solution, otherwise than in the matter of gradual slow effect.—Sir W. M. Bayliss, L. i./22,38.

We took the opportunity to manufacture some of the leading Colloidal Metal Solutions and our details of procedure are briefly given to assist those having occasion to work on the subject; and we have included herein details with Therapeutic Notes of other Colloidal Metals in Commerce.

Uses of Colloidal Metallic Solutions in general.—Subcutaneous, Intramuscular and Intravenous Injections of many of these have been given in infective conditions, *e.g.*, in pneumonia, pleurisy, peritonitis, influenza, typhoid, tuberculosis and other febrile conditions. They have also been used locally in cystitis, gonorrhœa, and epididymitis.

Copper and Selenium have been tried in malignant disease.

(1) CHEMICALLY PRODUCED.

Aluminium Hydroxide (*COLLOBELL.—T.M. 429532) 1%. A mildly astringent preparation for use as a gargle and mouth wash. Not for use hypodermically.

Antimony.

Antimony Sulphide Colloidal made according to the following directions has been used. *Dose.*—Intravenously up to 20 Cc.

A solution of Tartar Emetic 0·5% is saturated with Hydrogen Sulphide. The Acid Potassium Tartrate formed is removed by dialysis. The red liquid is tested by titrating with decinormal Iodine in presence of Sodium Bicarbonate and the strength adjusted to 1 : 500. Glucose 5% is added to isotonise, Gum Arabic 0·5% to render stable, and Phenol 0·5% to preserve. In Kala-Azar with some success.—L. Rogers, L. i./19,505.

Antimony Sulphide (*COLLOBELL) 0·04%. *Dose.*—2 to 10 Cc. intramuscularly twice weekly. In protozoal affections.

***Oscol Stibium.** *Dose.*—1 to 4 Cc. intramuscularly found to have beneficial effect in leprosy.—F. G. Causton, B.M.J. ii./20,76, 855. See also Jl. Trop. Med., Nov. 1/22,345.

1000 injections given. Dose used 2·5, 3 and 6 Cc. on consecutive days. Three weeks later 4·5 and 6 Cc. on consecutive days. The series was repeated during two months making a total of 40 Cc. Relief of paralysis. Results encouraging.—G. H. Wildish, B.M.J. i./22,55.

Leishmania Infantum.—Treated by colloidal Antimony Sulphide, 0·001 Gm. per Cc. *Dose*, 3 Cc. intramuscularly (buttocks), daily, on alternate weeks. In a fortnight spleen had decreased in size, and in 4 weeks regained normal position, but patient died from hæmorrhage (epistaxis).—R. Samut, L. i./22,995.

Arsenic.

We obtained a Colloidal Solution by reducing a 1% Arsenious Acid with Hypophospphrous Acid in the presence of a protective of Gelatin (1/4%). The solution can be dialysed and diluted for use to the strength 1 in 2,000. 1 Cc. would contain ½ mgr. The reduction does not appear to work by any means so well in a dilute solution. This hydrosol *of Arsenium*, however, is not permanent, and is impracticable commercially.—W. H. M.

Pure Colloidal Arsenic is much *less toxic* than Arsenious Oxide to animals.—Lecoq. J.C.S.A. 1910, ii./434.

Arsenic Sulphide (✱Collobell) 0·1%. *Dose.*—15 to 60 minims in water twice daily after meals. By injection, 1 Cc. twice weekly for a month. In blackwater fever, influenza, etc.

Bismuth Hydroxide (✱Collobell) 0·05%. *Dose.*—1 drachm 3 times a day between meals. In gastric affections.

Calcium. (The Calcium is in *a state of combination, not present as such*). *Dose.*—0·5 Cc. to 1 Cc. *hypodermically* under the skin of the back of the forearm every 5 or 7 days. Strength 1 in 2000. Protective used is Glutaminic Acid obtained from Gelatin.

In tuberculosis patients sleep better. A proportion lost tubercule bacilli in sputum. Temperature was lowered. Hæmoptysis and night-sweats ceased. Patients should be kept in bed if suffering from fever.

The above dose should not be exceeded. In a very acute case with high temperature and night-sweats 1 Cc. was given and the sweating ceased for 10 days but temperature remained rather higher and no benefit apparently followed.

In quite young children try 0·1 Cc. first and gradually increase.—E. E. Prest, B.M.J. i./22,53.

In addition to the injections (0·5 Cc. to be given first, then wait a week to see if there is reaction), Calcium Lactate *per os*, two or 3 grains one, two or three times a day. Many cases do not need an injection oftener than once a fortnight.—E. E. Prest, B.M.J. ii./22,283.

Mental disorders, some cases complicated by tuberculosis, treated with Colloidal Calcium Oleate and a collodial form of Calcium and Lecithin subcutaneously, 0·5 and 1 Cc. doses. Improvement.—T. C. Graves, L. ii./22,957.

Calcium Oleate (✱Collobell) 0·05%. *Dose.—per os.*, ½ or 1 drachm; hypodermically 0·25 to 1 Cc.

Copper.—V. Pöschl mentions a process of reduction of a Cupric Salt in the presence of Sodium Citrate or Sodium Tartrate. We tried this process but did not get much success with it and in any event some protective would be required. The method, as already stated, yields a brown Hydrosol which is unstable. Further we do not favour the use of a Tin Salt for a preparation for use therapeutically. We have, however, prepared the following:—

Colloidal Copper Solution. *Martindale.*

Dose.—5 Cc. subcutaneously, ½ to 1 Cc. intravenously, to be isotonised at time of use.

Manufacture.—On the lines of the process described by Gaube du Gers and W. Kopaczewski (Zeit. Chem. Ind. Kolloide 1911,9, 239–240, J.C.S.A. ii./12,51), with some modifications.

Strength 1 in 2,000.

The process is similar to that of Paal, *cf.* V. Pöschl, p. 65, viz., by warming the Copper Salt with a Sodium Albuminate Solution obtained by combining egg albumen and alkali. In the latter combination Lysalbinic and Protalbinic Acids are stated to be formed, which act as reducing agents. It is claimed the ultimate solution produced (there is no precipitate) retains the Copper in the colloidal form—the albuminous derivatives acting as protectives.

Keeping Properties.—Our experience is that this Solution keeps only when sterilised and subsequently filled into sealed containers.

Pharmacological Reports on the Author's Colloidal Copper Solution.

Rabbit wt. 1·9 *kg.* injected (intravenously on successive days) with dose of 2 Cc., 3 Cc., 4 Cc., 5 Cc., 7·5 Cc., and 10 Cc. (all isotonised).

Result.—Well tolerated except for apparent dyspnœa after the largest dose.

Our physiologist adds : In all cases the dyspnœa was slight, and (possibly) due rather to manipulation than to the substances injected.

It seemed desirable in view of untoward results with another Colloidal Copper preparation reported below to have the abov. investigation which wa provided in our 16th Edition *repeated* for purpose of corroboration :—

Our physiologist reports (14/10/16) as follows upon :—

(A). Intravenous injections of the 1 in 2000 solution after isotonising on rabbits Further,

(B). The effects of isotonised and of *not*-isotonised solutions were compared, by intramuscular injections, on cats.

(A). Tests by Intravenous Injections on Rabbits.

Rabbit I. Wt. 1·9 *Kg.*

5·0 Cc. was followed by very slight and questionable dyspnœa. 24 hours later further 5 Cc. produced no greater effect. 24 hours later further 10 Cc. produced distinct but temporary dyspnœa.

Rabbit II. Wt. 1·7 *Kg.*

5·0 Cc. was followed by distinct but slight and temporary dyspnoea and tremor. 5·0 Cc. on the following day produced distinct tenporary dyspnœa, but no obvious tremor. 10·0 Cc. 24 hours later produced pronounced dyspnœa tremor, and in-coordination, lasting about two minutes.

The antiseptic in the solution may be, in part, responsible for the effects observed.

(B). Tests by Intramuscular injections on Cats.

Cat I. Wt. 2·8 *Kg. Solutions isotonised.*

5·0 Cc. produced no obvious effect. 10·0 Cc. on the following day were followed by apparent slight salivation. The animal micturated two hours after the injection and showed little appetite in the evening. 19·0 Cc. 24 hours later led to slight dyspnoea, in-coordination and salivation. The animal emptied both bladder and rectum within half an hour and ate little or nothing in the evening. On the following day the animal was rather unsteady on its feet but ate well, and appeared normal 24 hours later.

Cat II. 2·5 *Kg. Solutions not isotonised.*

5·0 Cc. produced no obvious effect. 10·0 Cc. on the following day were followed by free salivation and micturition, and by loss of appetite. 20·0 Cc. 24 hours later led to immediate profuse salivation and to micturition The animal became drowsy, defæcated, and ate little or nothing in the evening. On the following day it was still drowsy but took a little food. 24 hours later it was more active and ate more freely.

Conclusion.—As far as can be judged from these experiments the *omission* of salt from the injection distinctly intensifies the toxic effects of the copper. There is not very much difference but the results show that 5 Cc. is tolerated by a cat intravenously or intramuscularly.

Sterules of Colloidal Copper Solution (1 in 2,000) 5 Cc. are prepared.

Uses.—For injection into cancerous tissues.

A theory has been promulgated (Champy) that Colloidal Copper on the surface of its particles may supply oxygen necessary to prevent abnormal cell growth as in malignant disease. Copper particles can be found in a malignant growth after injection near the seat of infection.

Injections into Tumours according to our pharmacologist, 14/10/16, may produce untoward effects by washing the products of metabolism of the tumour into the blood stream.

It is possible that injection of normal isotonic saline solution used in this way may do more harm than an injection of an equal bulk of not-isotonised copper solution.

It is seen from our pharmacologist's latest report (above) that dyspnœa and defæcation may be provoked by the copper, but they may also be provoked by many other substances. It is obvious that any injection made into a tumour should be of the smallest volume possible. 5 Cc. in one place is probably rather much to inject into a tumour, though very little to inject into normal subcutaneous tissue or into muscle.

L. Drage referred to earlier work with organic copper and in particular to this Colloid. He found the solution therapeutically active. 5 Cc. injections were made twice weekly to a patient suffering from advanced carcinoma of the liver. Result, improvement in general condition and diminution in size of growth.—L. i./14,1651.

In cancer Colloidal Copper 150 to 400 Cc. (strength not stated) intravenously. Definite effect in some cases.—B.M.J.E. ii./15,15.

Recurrent cancer growth. Thirty-four injections of Colloidal Copper caused disappearance of a nodule on the liver.—C. Mansell Moullin, B.M.J. i /18,472.

✱**Cuprase** (T.M. 386445).—Ampoules contain 5 Cc. for a dose, or commence with 2½ Cc. only.

A suspension of Colloidal Copper Hydroxide used for subcutaneous injection in cancer. Stated to arrest development of tumours. It may be necessary to give Cocaine 1/6th grain in advance.

Serious effects from use of Cuprase have been reported. For references see last edition.

Iceland Moss used in making Colloidal Copper.—J.C.S.A. ii./20,22.

Copper Phosphate (Colloidal) Suspension.

Dose.—Hypodermically 1 Cc. (=0·01 Gm. Copper Acetate) by a deep injection into the buttock.

Mix a solution of Copper Acetate 1 Gm. in Glycerin and Water of each 20 Cc., with a solution of Sodium Phosphate 5 Gm. in Glycerin and Water of each 30 Cc.

Tuberculosis has been treated by this injection. If the resulting reaction is slight the injection is repeated at discretion.—B.M.J.E. i./13,95.

Gold.

We conducted numerous experiments, employing as reducing agents Hypophosphorous Acid, Formaldehyde and Hydrazine Sulphate (Gutbier's process as mentioned in V. Pöschl). The conclusion we came to was that Gutbier's method in which we used Gelatin as protective works satisfactorily. This Hydrosol can be boiled to sterilise.

The following which we devised is easy of preparation :—

Neutralise a Gold and Sodium Chloride Solution with dilute Sodium Carbonate Solution and adjust the strength to 0·05% Au. With 10 parts of this solution mix 10 parts of a Solution containing the calculated amount of Formaldehyde required to reduce the Gold, reckoning 3HCOH to 2 molecules of the Gold Compound. Employ Gelatin as protective. Warm to effect reduction and sterilise. The finished Hydrosol is to contain 0·025% (1 in 4,000) Au and the same amount of protective. It is **red** in colour.

Physiological Report.

Rabbit, Wt. 2·3 *kg.* injected intravenously on successive days with 2 Cc 3 Cc , 4 Cc , 5 Cc., 7·5 Cc., and 10 Cc.

Result.—Well tolerated except for slight dyspnœa after the dose of 5 Cc. Two days after the last dose (10 Cc) of Colloidal Gold this rabbit was given 10 Cc. of Colloidal Selenium, which produced slight dyspnœa

Sterules of Colloidal Gold Solution 0·025% containing 5 Cc. are prepared and are suggested for injection. The solution may be approximately isotonised by adding 1 Cc. of 5·5 per cent. Sodium Chloride Solution at the time of use. **Sterules** of this **Salt Solution** are made.

Dose.—Suggested 5 Cc.=0·00125 Gm. ($\frac{1}{50}$ grain approx.) increased intramuscularly or intravenously.

Uses.—See Therapy in general—*antea.*

Neurasthenia, Alcoholism and Morphine Habit treated by colloidal gold. In epilepsy, alcoholic neurasthenia and migraine this colloidal preparation has been given *hypodermically* four times daily (usually, 2 Cc. divided over the day, but this may be increased) combined with bitter tonics and digestives, every two hours, *per os.* Details of three remarkable cases. Natural sleep was restored, appetite returned and nervous symptons disappeared ; no ill effects. —D. E. Stanford Park, L. i./22,691. See also Jl. Ineb., April 24.

Chemical Reference.—Theo. Svedberg Zeit. Chem. Ind. Kolloid, 1909, ii./389; J C.S.A.; ii./1910,108.

Iodine. (*Non-Metal.*)

Colloid Iodine Sol 1 in 2,000.—*Martindale.*

Dose.—1 to 4 drachms (**4 to 15 Cc.**) diluted *per os. Not suitable for intravenous use.*

Manufacture. — After experimenting we devised the following :—

Dissolve Sodium Iodide and Hydrochloric Acid (*Off.*) of each 1·18 Gm. in 3% Glucose Solution 250 Cc.

Dissolve further Sodium Nitrite 0·543 Gm. in 250 Cc. of the same strength Glucose Solution. Add this solution to the former. Finally dilute the liquid to 2,000 Cc. with 3% Glucose Solution.

The interaction is :

$$NaNO_2 + NaI + 2HCl = 2NaCl + NO + I + H_2O$$

The Nitric Oxide is removed. The Iodine is in a nascent active condition.

It will be observed that the amount of Sodium Chloride present is practically 0·045%, *i.e.* $\frac{1}{20}$ approx. of that of Normal Physiological Saline.

Protective.—We have experimented with other protectives but Glucose offers the best properties.

Tests.—To 5 Cc. of a Colloidal Iodine preparation in a test tube add ½ Cc. Carbon Bisulphide or Chloroform, shake and allow to separate. The solvent will be of a fairly deep violet colour, which is not increased by adding a little Sodium Nitrite and Hydrochloric Acid, showing that all the Iodine is in the free condition.

The Iodine in preparations of commerce found to be far below the strength stated and not in the colloidal form.—Prof. A. J. Clark, B.M.J. i./23,273.

✱**Collosol** (T.M. 350478) **Iodine** is supplied in liquid and paste, ointment and oily form.

Dose.—1 to 4 drachms (**4 to 15 Cc.**) twice or thrice daily after meals. Intravenously 10 to 200 Cc.

Uses.—As a substitute for alkaline Iodides, *e.g.*, in syphilis, rheumatic affections, tuberculosis, bronchial and nasal catarrh.

For rheumatic affections the preparation is advised by iontophoresis. Collosol Sulphur to be given internally. For catarrh, the effect is to render mucous secretion more fluid and less adherent.

Intravenously as much as 300 Cc. have been injected with impunity in cases of pyæmia and also to produce softening of fibrous tissue.

References.—Eczema effectually treated by Collosol Iodine. Also bad chilblains (oil form employed), and for internal use in the later stages of syphilis, as symptoms of iodism are not produced. Dhobie's itch cleared up quickly under the preparation (oil form).—Sir M. Morris, B.M.J. i./17,617.

Pasta Collosol Iodine (PASTE FORM) for local use only.

For long standing ulcers effect is rapid. It is suggested to apply alternately with the similar preparation Pasta Collosol Argentum for bactericidal effect. The *oil form* (3%) and *ointment* are used for chilblains and ulceration.

Colloidal Iodine in Oil (✱COLLOBELL) 3%. For chilblains.

Iron.—It is a difficult matter to produce a stable Hydrosol of *Metallic Iron* by Chemical means.

Discussion about a Colloidal Iron preparation. Simple fundamenta involving use of a piece of litmus paper.—Sir W. J. Pope and Prof. A. J. Clark, B.M.J. i./23,731.

Liquor Ferri Dialysatus, B.P., '85, is a colloidal solution of Ferric Hydroxide, unprotected.

Colloidal Ferric Hydroxide (✱COLLOBELL) 0·1%. *Dose.—per os*, 1 drachm. In anæmia.

✱IDOZAN (T.M. 419403). Described as a 'Colloidal Iron Concentrate,' containing 5% of Iron.

Dose.—1 drachm thrice daily after meals, increased to 1 tablespoonful.

Has been used in the treatment of anæmic conditions, especially such as are due to an impaired regeneration of blood.

Lead.

Malignant neoplasms appeared to be arrested by **Colloidal Lead intravenously.** There is support of the suggestions in the abortifacient action of Lead. Large doses of Lead have a cumulative poisonous effect on embryonic cells—an effect which is most marked in the earlier stages of pregnancy. Lead (also Copper.—W. H. M.) combines with Lecithin and may be expected to influence growth of tumours rich in phosphatids. It was found experimentally that 0·495 Gm. of Lead combines with 1 Gm. of lecithin. A large number of variations of Colloidal Lead were made, but it was impossible to say which was best therapeutically.—W. Blair Bell, L. ii./22,1006.

Manganese.

Colloid Sol Manganese.—*Martindale,* 1 in 400.

We have prepared this on the following lines :—

1. Dissolve Manganese Chloride ($MnCl_2 + 4H_2O$) 1·8 Gm. in Glucose Solution 3% 100 Cc.

2. Mix N/1 Sodium Hydrate Solution 18 Cc. with Glucose 3 Gm. and add Distilled Water to 100 Cc.

The Sodium Chloride Content is 0·53%.

Filter each solution if necessary and add 0·5% Phenol to each.

For use mix equal quantities of the two solutions.

PHYSIOLOGICAL EXPERIMENTS.

Subcutaneously in rats 1 Cc. of combined solution given on two consecutive days produced only slight malaise and the animal recovered completely.

Intramuscularly in cats under observation three weeks 2 Cc. doses of combined solution at weekly intervals were followed by loss of appetite. There was, however, complete recovery. Effects in man should be carefully watched before giving large or frequent doses. It has not, however, appeared in these experiments that 2 Cc. doses would be dangerous for man unless prematurely repeated.—May 11/20.

***Collosol Manganese** is supplied in two solutions to be mixed at the time of use producing a 0·25% solution.

Uses.—Gonorrhœa and sequelæ also eczema, acne and quinsy, have been treated by it—(*cf.* Pallamine).

Gonorrhœal ophthalmia treated by Colloidal Manganese 1 Cc. intramuscularly, repeated, with success.—D. M. Livingstone, B.M.J. i./19,404. Boils cured by Collosol Manganese.—B.M.J. ii./18,160.

Manganese from chimney fumes has caused poisoning.—J. Gairdner, L. ii./18,434.

Manganese appears to act as a peroxidase; in the colloidal form (Collosol) it is practically non-toxic.—L. ii./18,474.

Antral and other suppuration treated by injections into subcutaneous tissues, intermuscular septa or the periosseous tissues.—E. Watson Williams, Pr. May, 1920.

Boils and suppurating glands treated by Colloidal Manganese intramuscularly, ½ Cc. doses. May be very painful.—H. E. Waller, Pres. June, '20.

Hodgkin's disease well treated after Sodium Cacodylate had failed to improve.—R. Samut, L. i./22,17.

Psoriasis treated—6 to 16 intramuscular injections.—J. Moore, B.M.J. ii./22,41.

Urticaria treated.—B.M.J. ii./23,563.

Mercury.—We have experimented on the reduction of Mercurous Nitrate by Stannous Chloride with a view to obtaining a Colloidal Solution, using albumen as protective.

We discarded it as we obtained very much better results by reducing Mercuric Chloride with Hydrazine and employing Gelatin as protective. Dialyse subsequently and adjust to 1 in 2,000.

Physiological Report.

Rabbit wt. 2·0 *kg.* injected (intravenously on successive days) with doses of 2 Cc., 3 Cc., 4 Cc., 5 Cc., 7·5 Cc., and 10 Cc. (all isotonised).

Result.—Well tolerated except for apparent dyspnœa after the 5 Cc. dose.

Sterules of Colloidal Mercury Solution are prepared containing 5 Cc. of 1 in 2,000 Solution=0·0025 Gm. (1/25 grain) Colloidal Mercury. May be isotonised at the time of injection by 1 Cc. of 5·5% Sodium Chloride Solution.

Dose.—Suggested 5 Cc.=0·0025 Gm. ($\frac{1}{25}$ grain) intramuscularly or intravenously.

Uses.—In syphilitic affections; see also Therapy in general—*antea*, and **Collosol Hydrargyrum**, *postea*, under Collosol Argentum.

Sterules of Colloidal Mercury 0·001 Gm. with Colloidal Sulphur 0·001 or 0·00033 Gm.

Mercury and sulphur Treatment in syphilis. The addition of sulphur increases the tolerance of the patient to mercury, patients suffering, *e.g.* with stomatitis, intestinal disturbance, and even vomiting and mucorrhœa from 0·01 Gm. doses of the biniodide or cyanide tolerate same when daily sulphur injections are added. The contents of a Sterule diluted to 12 or more Cc. is injected into the gluteal muscles or into a vein of the arm. Reports of 500 intravenous and 1500 intramuscular injections of this type with good effect. The intravenous injections are the more active and may at first cause a febrile reaction with restlessness and headache; this reaction varies according to the amount of sulphur used. The Wassermann reaction was rendered negative in 86 out of 121 cases. Effective in previously rebellious lesions of the lips, mouth and genitalia, in leucoplakia, in keratitis and iritis, in joint involvements and in syphilitic arteritis and nephritis. Under arteritis are classed 7 cases of cerebral arteritis with paretic disturbances, vertigo or headache, and six cases of aortitis. In 6 out of 10 cases syphilitic albuminura disappeared under the treatment. In several instances mercury biniodide and benzoate and arsenobenzol had previously failed.—M. Loeper, A. Bergeron and K. Vahram Bull. et Mem. Société Médic. des Hôpitaux de Paris, Feb. 8th, 1917.

Palladium, **Colloidal Palladium.** *Syn.* **Pallamine.**

Colloidal Manganese is most efficacious in gonorrhœa in the acute stage, but as there is delay after injecting it before its maximum oxidising power is reached, Palladium has been suggested to precede. This would instantly dissociate certain hydrogen and OH groups in the system. Palladium has the action of liberating the OH group from H.OH and temporarily fixing the H group.

Potassium Nitrate and Methylene Blue are given on the theory that the liberated hydrogen can be used by reducing the former to a nitrite and the latter to its leuco base, two products less irritating than hydrogen. When Potassium Nitrate is being given, eliminate Sodium Chloride from the diet as far as possible.—J. E. R. Mac. Donagh, B.M.J. ii./18,31.

Epilepsy well treated by Pallamine. ½ Cc. doses intramuscularly at 3 day intervals.—A. C. King-Turner, B.M.J. ii./18,255.

Platinum.—This Colloidal Solution we found best prepared chemically by reducing a Platinous Salt, *e.g.*, Chloro-Platinite of Potash of commerce with Hydrazine in the presence of Gelatin as protective. A Colloidal Solution made in this way after previous dialysis can be adjusted to strength 1 in 4,000 (0·025%).

Physiological Report.

Rabbit wt. 2·3 *kg.* injected intravenously, on successive days, with doses of 2 Cc., 3 Cc., 4 Cc., 5 Cc., 7·5 Cc., and 9 Cc.

Result.—Well tolerated except for slight dyspnœa after the largest dose.

Sterules of Colloidal Platinum containing 5 Cc. of 0·025% Solution are prepared=0·00125 Gm., Platinum (1/50 grain). May be isotonised for use with 1 Cc. of 5·5% Sodium Chloride.

Dose.—Suggested, 5 Cc.=0·00125 Gm. ($\frac{1}{50}$ grain) intramuscularly or intravenously.

Uses.—See Therapy in general—*antea*.

Intravenously 3 to 7 Cc. Colloidal Platinum caused a rigour in ½ hour followed by rise in temperature to 104 or 105° F. with perspiration, sickness

and headache. Temperature then fell to subnormal—this reaction occurred both in normal subjects and those suffering from diseases characterised by moderate pyrexia—namely subacute pleuritic and pneumonic conditions and protacted paratyphoid fever—the fall of temperature coincided with a great improvement in the general condition to a great extent—results attributed to a great extent to the Peptone used as protective.—A. G. Auld. B.M.J. i./18,195.

Selenium.—

Manufacture.—An Alkali Selenide is treated with Acid in presence of protective Colloid. The Colloidal Solution is to be isotonised with Saline at the time of use, to render it approximately isotonic with the blood.

Physiological Report.

Rabbit wt. 2·1 *kg.* injected intravenously, on successive days, with 2 Cc., 3 Cc., 4 Cc., 5 Cc., and 7·5 Cc., respectively.

Result.—Tolerated without ill effect. Selenium was also administered to the rabbit which had previously been injected with **Colloidal Gold**, *vide antea.*

Sterules of Colloidal Selenium are prepared containing 5 Cc. of 1 in 5,000 Solution=0·001 Gm. (1/64 grain) Selenium. The Solution may be approximately isotonised by adding 1 Cc. of 5·5% Sodium Chloride Solution at the time of use. **Sterules of this Concentrated Saline** are prepared.

Dose—Suggested, 1 to 5 Cc. hypodermically, intramuscularly, or intravenously.

Uses.—Has been suggested for use in malignant disease—see also Therapy in general—*antea.*

A preparation of colloidal selenium was tried on mice and rats with grafted malignant growths, but without effect. This preparation was non-toxic whereas that of Wassermann (Selenium and Eosin) is described as being highly toxic. Other compounds of selenium and eosin, found by experiment to be toxic, were tried, but none of these had any selective action on the tumour cells.—C. E. Walker, Lancet, May 18/1912, p. 1337.

Collosol Selenium effected diminution of pain used intramuscularly and intravenously—E. Watson-Williams, B.M.J. ii/19, 463,516.

Malignant disease treated by 'Selenium.' Large doses (5 Cc.) 'spell disaster.' Temporary improvement only can be expected.—Gillett and Wakeley, B.M.J.E. ii./22,15. *See also* further abstracts under Selenium.

Silver.

We obtained a satisfactory *Colloid Silver Solution* by a slight modification of Carey Lea's process—which is briefly as follows:—

Mix 250 Cc. of 30% Ferrous Sulphate Solution with a Solution of 140 Gm. Sodium Citrate in 250 Cc. of Water. Pour this mixture into 250 Cc. of 10% Silver Nitrate Solution with continual stirring. Wash by decanting with Sodium Citrate Solution 5%, dissolve precipitate in Water, and precipitate again with Sodium Citrate (twice), until it is practically free from Iron. In this manner a dark grey Colloidal Solution of strength 1% is prepared, which must contain protective Colloid. The preparation is finally adjusted to the strength 1 in 2,000 for therapeutic use.

As an alternative it is stated that well washed Silver Oxide may be reduced by a rapidly stirred 60% Formalin.—A. Pickles, Chem. News, 1918, 117, 358. Y.B.P; 1919, 109.

Physiological Report on our Preparation.

Rabbit wt. 1·85 *kg.* injected intravenously, on successive days, with doses of 2 Cc., 3 Cc., 4 Cc., 5 Cc., 7·5 Cc., and 10 Cc. (all isotonised).

Result.—Well tolerated except for slight dyspnœa after largest dose.

Sterules of Colloidal Silver containing 5 Cc. of 1 in 2,000 Solution are prepared. May be isotonised with 1 Cc. of 5·5% Sodium Chloride Solution.

Dose.—Suggested, 5 Cc. = 0·0025 Gm. ($\frac{1}{25}$ grain) intramuscularly or intravenously.

Uses.—In gonorrhœa and cystitis *cf.* also Therapy in general —*antea.*

Collosol Argentum (1 in 2,000).

Dose.—*Hypodermically* 15 or 30 minims (**1 or 2 Cc.**). *Per os*—One drachm (**3·5 Cc.**) (on an empty stomach as it inhibits digestion). Gargle.—One part diluted with three of Water. (Dilution is necessary on account of frothing of Collosols.) Eye Drops.—A few drops instilled between the eyelids or as douche diluted with 3 times quantity of water. *Locally.*—Undiluted or diluted with 3 to 4 parts of Saline Solution (1%), and in any quantity as a swab or lotion.

It is chemically prepared. Precipitation by the blood does not occur immediately on hypodermic or intravenous injection.

Uses.—Intended for use by hypodermic injection or for giving by the mouth, and to be alterative and antiseptic.

For septic and infective wounds, gonorrhœa (et sequelæ), cystitis, dysentery, hæmorrhoids, and nose, ear, eye, mouth and skin infections. Pyorrhœa alveolaris has been treated by 2 to 3 minim injections into the sockets of the teeth. Whooping cough has been treated by spraying.

Bactericidal power. Destructive to the *meningococcus*, also anthrax and typhoid organisms. After 2 Cc. and subsequently 3 Cc. injections intravenously in rabbits the particles could be found in the cerebro-spinal fluid, brain and urine.

Collosol Argentum 20 Cc., intravenously every 48 hours, given without untoward effect.—T. H. Sanderson-Wells, L. i./18,258.

It is stated that the electrically prepared suspensions differ in being precipitated by Sodium Chloride in dilute solution.

Experimental injections of 1 to 2 Cc. gave little or no local or general symptoms. Results in practice are as follows:—Successfully treated were *topically* —Septic and follicular tonsillitis, Vincent's angina, phlyctenular conjunctivitis, gonorrhœal conjunctivitis, spring catarrh, impetigo contagiosum, acne of face and body, septic ulcers of legs, ringworm of body, tinea versicolor. Soft sores, suppurative appendicitis after operation (the wounds cleaned rapidly). Pustular eczema of scalp and pubes, chronic eczema of external meatus of ear with recurrent boils, also chronic eczema of anterior nares. Offensive discharge in case of chronic suppuration in otitis media, bromidrosis of feet and axillæ. Blind boils of neck. *By injection*—Gonorrhœa and chronic cystitis (local), boils, epididymitis.—C. E. A. Macleod. L. i./12,322.

Sprue treated by 1 to 2 or more drachms three or four times *p.d.* Improves the condition of the motions. Effectual when temperature was over 101° F. and death anticipated.—Sir J. Cantlie, B.M.J. ii./13,1297.

Pyorrhœa cured by 15 minims of Collosol Argentum hypodermically in the arm. Corneal ulcer with acute inflammation disappeared by 2 drops in the eye. Septic diarrhœa following intestinal obstruction and successful removal of appendix stopped by 20 minims hypodermically. Useful as nose

spray for post nasal catarrh and for simple nasal catarrh. Abscess on the hand due to bullet wound well treated.—A. H. Boys, B.M.J. ii./16,586,924.

Pasta Collosol Argentum is also made for use to wounds, burns, skin affections, chilblains and hæmorrhoids. Acne has been well treated.

Collosol Hydrargyrum is of similar strength, dose and properties.

The preparations kill *B. Coli*, *B. Tuberculosis*, *Gonococcus*, *Staphylococcus*, *Streptococcus*, etc., in a few minutes. Non-toxic to the human organism, non-irritant in wounds and operative work,—promotes a quick healing in cuts and sores.—B.M.J. i./12,520.

Collosol Silver and Mercury have considerable antiseptic action but little bactericidal. The experiments for the antiseptic action were done by adding the Test organism to the preparation or its dilution and then after 5, 10, etc. minutes, broth was inoculated. For the *bactericidal* effect the preparation was added to the nutrient medium and then inoculated with the organism.—Prof. C. R. Marshall & G. B. Killoh, B.M.J. i./15,102.

Collosol Argentum Beta is 1 in 400, *i.e.*, 5 times the strength of the ordinary preparation. It is directed to be diluted with warm water or normal saline.

Sulphur.—We have prepared a 1 in 1,000 opalescent Colloidal Sulphur Solution by decomposition of a mixture of Sodium Sulphide and Sodium Sulphite with Acid in the presence of protective Colloid.

Sterules containing 2 Cc. of 1 in 1,000 Solution isotonised at the time of use with 0·4 Cc. of 5·5% Saline. *Dose suggested*, 1 to 5 Cc. (=0·001 to 0·005 Gm.).

Suggested for use in skin affections and wherever Sulphur is indicated through excessive elimination.

Sulphur Collosol (1%).

Dose.—Per os 2 to 4 drachms (8 to 15 Cc.) in a wineglass of water twice daily during or after principal meals. Subcutaneously or intravenously, 1 to 2 Cc.

Uses.—Colloidal Sulphur it is claimed is a very active form of sulphur which readily combines with protein and is entirely absorbed in the stomach. Rheumatic affections much relieved. **Collosol Sulphur Cream** to be used with it by gentle massage is also prepared. An *Oil* for the Scalp is also made. Also a variety for *baths* and external use and for *injection*.

Collosol Sulphur beneficial in acne, acne rosacea and seborrhœa. Baths for relief of generalised, acute psoriasis and painful fibrositis.—Sir Malcolm Morris, B.M.J. i./17,617.

SCROFULOSIS.—When secretion from the eyes is present suggesting bacterial infection 1% Collosol Sulphur as drops for the eyes or instillation into the nasal cavities useful.—P. A. Harry, Pres., June, '20.

Chronic PAINFUL MUSCULAR AFFECTIONS treated by 1 Cc. doses of 1 in 1,000 Colloidal Sulphur as made by the writer's (J. D. Comrie's method.—L. June 30,17) with good results.—Pres., June, '20.

The ✱ "**Oscol**" (T.M. 305256) brand of Colloids includes Antimony, Silver, Copper, Mercury, Iron, Iodine and Sulphur.

Oscol **Silver** has been used in gonorrhœa, phthisis, pneumonia, bronchitis, pyorrhœa alveolaris, hay fever, septic conditions of the nose, wounds, throat, ear, cystitis and acne. Oscol **Copper** in cancer. Oscol **Mercury** in syphilis and tonsillitis. Oscol **Ferrum** in chlorosis and debilitated conditions. Oscol **Iodine** in all cases where this halogen is indicated. Oscol **Sulphur** in rheumatic affections.

(2) ELECTRICALLY PRODUCED.

General Directions.—

With regard to making these Colloidal Solutions electrically by working from the main our experience is that the intensity of current necessary is considerable—the ordinary wiring for lighting is not sufficient. Special wiring is required as in the case of a power circuit. With this latter, resistance can be introduced so as to adjust the intensity to about 8 ampères. The intensity necessary varies with the type of metal under consideration.

Pure Distilled Water must be used and the electrodes must be so arranged as to produce a uniform arc beneath the surface. After sparking for a sufficient length of time the solution is to be standardised.

Antimony, Colloidal made by sparking from an induction coil through antimony under chloroform. Possesses trypanocidal properties.—U. N. Brahmachari, L.ii./16,728. I. Med. Gaz., May, 1916. See also Antimony Colloidal chemically produced.

Copper.

Working on the lines of our general directions above we were not successful with a pure Colloidal Copper Solution. We prefer the **Chemical Method** for this element. *q.v.*

Electrocuprol.

Dose.—1 to 20 Cc. intravenously, isotonised by mixing with Saline.

A brown solution described as a Colloidal Solution of Copper Oxide containing 0·15% Copper. Ampoules 5 and 10 Cc. are prepared.

Uses.—In malignant disease and tuberculosis.

Gold.—We have prepared Colloidal Gold Solution electrically as described under general directions, the product being of a dark bluish purple colour. **Sterules** 5 and 10 Cc., are prepared 1 in 4,000 strength, to be isotonised at time of use with 1 and 2 Cc. respectively of 5·5% Sodium Chloride Solution.

Uses.—*Vide* Therapy in general—*antea.*

Iodeol.—An electrically prepared Colloidal Oily Iodine Solution containing 0·2 Gm. of Iodine per tube of 1 Cc.—a dose by intramuscular injection. Has been used in pulmonary and rheumatic affections.

It is stated that 10 minutes after "application upon the skin" Iodine can be found in the urine.

Capsules containing 0·25 Gm. Iodine and **Ovules** are prepared.

Iodargol is similar, containing 0·4 Gm. of Iodine per tube. Stated to be a non-toxic, painless solution for injection by means of an urethral syringe in gonorrhœa and allied infections.

Iron.—The general directions are not applicable in this case, hydroxide of iron being the only product; we doubt if it is possible to prepare a true metallic iron colloid in an aqueous medium.

Mercury.—Our experiments showed that the electrically prepared colloid is difficult to obtain and not more satisfactory than the *chemically prepared* product. *q.v.*

Electro-Hydrargyrum, a grey solution, stated to be electrically prepared.

Dose, average.—3 Cc. per day (rendered isotonic with Saline at the time of injection). Single doses up to 6 Cc. have been used.

Ampoules containing 5 Cc. of 0·1% of Mercury Solution to be isotonised at time of use are supplied.

Uses.—In syphilis, tabes (intraspinal injections), locomotor ataxy, and chronic meningo-myelitis.

Electroplatinol.—Grey in colour; and **Electropalladiol.**—Greyish brown in colour. Used similarly to Electrargol.

The Platinum preparation (content 0·025%) has been tried in pneumococcal meningitis and pulmonary tuberculosis and in obesity.

Selenium.—

With regard to this element our experience was that the electrical method is unsuccessful. On the other hand the **Chemical Process** of manufacture is one to which we devoted considerable attention.

Electroselenium (Erythroselenium) is electrically prepared.

Dose.—2 to 10 Cc. intravenously daily or every other day commencing with 2 to 3 Cc. and increasing according to reaction and sensitiveness of the patient.

A dichroic red solution, isotonic and containing 0·02% Colloidal Selenium with added protective. Ampoules contain 5 Cc. It is said to be less toxic than the mineral compounds of Selenium. Claimed to be bactericidal *in vivo* but only feebly germicidal *in vitro.*

Uses.—The palliative treatment of cancer.

Seleniol.—An electrolytic colloid of Selenium. Mixed cell sarcoma of the tonsil and deep glands and another case—extensive fungating growth of the larynx, causing obstruction. 3 Cc. doses thrice weekly into the tissues close to the thyroid cartilage. General improvement.—L. i./13,612.

Silver.—

With this element we found the disruption of Colloidal particles proceeded with ease and a 1 in 2,000 Solution can be made.

Dose.—5 to 10 Cc. which may be isotonised with 1 and 2 Cc. of 5·5% Sodium Chloride Solution.

Uses.—In venereal affections, also in other infective diseases *cf.* Therapy in General. **Sterules of Electric Colloidal Silver** 5 and 10 Cc. are prepared.

* **Electrargol (T.M. 351388)** —A reddish brown solution ('stabilised') containing 0·025% of Silver.

Dose.—1 to 10 Cc. intramuscularly, after rendering isotonic with saline (supplied). Ampoules 5, 10 and 25 Cc.

Uses.—In diseases of the genito-urinary organs and infective diseases in general. Intrapleural Injections of 15 to 50 Cc. have been made in pleurisy.

F. Antiseptic Powers of Colloidal Solutions.

Bacteria, being colloidal in character, are negatively charged. Positively charged colloids are theoretically at all events *ipso fa to* germicides.

Colloids of the following are strong germicides: silver, mercury, mercuric chloride, mercuric cyanide, thorium, arsenious acid, antimony, cobalt, iron. The following colloids are weak germicides: aluminium, bismuth, copper, lead, zinc. And the following, it may be interesting to add, though positively charged, are non-germicides: sulphur, selenium, cadmium, gold, palladium, platinum, iridium, rhodium, tantalum, zinc, tin, magnesium, graphite. Colloid silver has the curious property, when injected intravenously, of rendering rabbits immune from anthrax and diphtheria bacilli.—Pres., June, 1920.

For further details see Antiseptic Powers, Vol. II., 'Colloidals.'

G. Metal Organosols.—

If Lanolin, impregnated with an aqueous solution of the salt of a heavy metal, is triturated with a solution of alkali Hydroxide, double decomposition occurs and the Oxides or Hydroxides of the heavy metals are obtained as Colloids. If readily reduced the Oxides may thus produce the Colloidal Metals. After removing the water and electrolytes present the residue will dissolve in all organic solvents in which Lanolin is soluble By evaporating

the solvent, solid colloidal products with high metal content are obtained. The protective action of the Lanolin is possessed in a still more marked degree by the Lanolin Alcohols (*e.g.*, Cholesterol). By the use of the unsaponifiable wool-fat residue a still higher percentage of metal can be obtained. Details are given *re* **Silver Organosols** made by this method.—C. Amberger (Zeit. Chem. Ind. Kolloide, 1912,11,97—100), J.C.S.A. ii./12,1053.

Gold Organosol has also been made by this method.

Complete reduction of the initially precipitated Oxide is effected by Hydrazine Hydrate. The product containing Lanolin as protective dissolves in Ether, Petroleum Ether, Fats and Liquid Paraffin, giving deep blue solutions. Chloroform gives reddish violet solution. By precipitating the Solution in Petroleum Ether with Alcohol, a pasty product containing a considerable amount of Gold is obtained. It can be dried, forming granular masses soluble in Liquid Paraffin and Chloroform, but only slightly in Petroleum Ether and Ethyl Ether.—J.C.S.A. ii./12,1059.

'Lanosol' Silver.

We repeated these experiments so far as Silver is concerned using 100 Gm. Anhydrous Lanolin, 30 Cc. 5% Silver Nitrate, 30 Cc. Water with 3 Cc. 10% Ammonia and 30 Cc. Water with 2 Gm. Hydroxylamine Sulphate. The yield by precipitating the Petroleum Ether Solution with Spirit (4 volumes) was 40 Gm. It formed a brown pasty mass containing less than 0·5% Silver. Theory would be approximately 2·25% Silver.

For Colloids and Crystalloids in relation to the constitution of the body and physiological processes, *cf.* Iontophoresis Vol. II.

H.—GENERAL REFERENCES.

We are compelled to omit a large number of Refs.—see last Edn., p. 366.

Colloidal Metals. Successes with.—B.M.J. i./14,1016

Colloidal Solutions.—P.J. i./14,109.

Colloids and their use in Medicine.—R. Cecil Owen, P.J. i./20.497.

Colloids in general practice.—Pres., June 1920 (there is a good Bibliographic Summary, p. 249, *et seq.*, of that issue).

The formation of colloids. A monograph by Theo. Svedberg, 1921.—Churchill, L. ii./21,28.

COLOCYNTHIDIS PULPA (*Off.*).

Bitter Apple.

Dose.—2 to 8 grains (**0·12 to 0·5 Gm.**).

The dried pulp or pith of the fruit of *Citrullus Colocynthis* (*Cucurbitaceæ*) freed from the seeds. Has a markedly bitter taste, is free from starch, and contains only about 3% fixed oil or less (2% *Off.* and U.S. IX.) whereas the seeds contain 15% or more. Is imported from Smyrna (the best) and Spain. According to U.S. IX must not contain more than 5% of seeds, nor more than 15% of ash.

Antidotes.—Spirit of Camphor 10 drops on sugar or in milk every ¼ hour, Laudanum 30 minims (by rectal injection if not able to swallow). Stimulants, demulcent drinks, apply warmth.—Murrell.

Colocynth Poisoning. A teaspoonful and a half proved fatal.

A woman took 75 grains in powder. Vomiting and diarrhœa persisted for some hours. Treatment was Arrowroot, Morphine and Atropine. After two days Chloretone in Olive Oil every six hours and a purely milk diet. Ultimate recovery. There was little abdominal pain throughout. Literature shows that nearly all cases where doses of 110 grains and over have been taken have ended fatally. Gastro-intestinal symptoms in such cases are most marked, leading to rapid collapse.—R. B. Roe, L. i./13,1527.

Uses.—A drastic cathartic. A frequent ingredient in aperient pills. For formulæ *see* Index, "Pills."

Extractum Colocynthidis Compositum (*Off.*).

Dose.—2 to 8 grains (**0·12 to 0·5 Gm.**).

This is now *powder form*, made by extraction of Colocynth Pulp, and adding Extract of Aloes, Scammony Resin, Curd Soap in powder and powdered Cardamom Seeds.

Extractum Colocynthidis. U.S. IX. *Average dose*, ¼ grain. Made with Diluted Alcohol from seed-free pulp, reducing the extract to powder and diluting with Starch so that 1 of extract equals 4 of drug. Colocynth yields about 40 or 50% to alcohol.—Caspari.

Pilula Colocynthidis Composita (*Off.*).

Dose.—4 to 8 grains (**0·2 to 0·5 Gm.**).

Contains Colocynth Pulp, Aloes, Scammony Resin, Potassium Sulphate, and Oil of Cloves with Water *q.s.*

Pulvis pro Pilula Colocynthidis Composita consists of the ingredients of the pill less the water. Is more convenient for dispensing.

℗ **Pilula Colocynthidis et Hyoscyami** (*Off.*).

Dose.—4 to 8 grains (**0·25 to 0·5 Gm.**).

Compound Colocynth Pill 2, Hyoscyamus Extract 1, with Water *q.s.*

Hamilton's Pill.

Compound Extract of Colocynth 2, Hyoscyamus Extract 1. Made into 4 grain pills. This is stated to be less griping than the last.

Tinctura Colocynthidis, P.G.V.

Dose.—3 to 15 minims (**0·2 to 1 Cc.**). (Maximum single dose, 1 Gm.; maximum daily dose, 3·0 Gm.). Strength 1 in 10 alcohol (90%).

Colocynthin. $C_{56}H_{84}O_{23} = 1124·952$ The active principle, a glucoside, of Colocynth in the form of an amorphous yellow powder. Has been employed as a hypodermic purgative.

Dose.—15 minims of a 1% solution in Glycerin, approximately ⅙ gr.

It occurs to the extent of 0·6%. It readily reduces Fehling's Solution.

Cucumis trigonus (*C. pseudo-colocynthis*, Royle). Common in the Bombay Presidency, contains colocynthin or body closely allied.—Naylor, P.J.ii./07,117.

CONIUM.

Hemlock. *French*—Ciguë. *German*—Gefleckter Schierling.

Both the dried unripe fruits and the fresh leaves and young branches of *Conium maculatum* (*Umbelliferæ*), collected when the fruit begins to form were in B.P. '98.

Dose.—2 to 8 grains (**0·12 to 0·5 Gm.**). U.S. VIII. Standard 0·5% conine. (Conium is now removed from U.S.P.) Fr. Cx.—*Max. single dose* 4 grains, max. during 24 hours 12 grains approximately.

Conium fruit contains 0·36 to 0·91% of Conine. A standard of 0·5% has been suggested. The fruit contains more than the leaves.

For further chemical details on Conium, see Vol. II.

ℙ1 **Coninæ Hydrochloridum.** Silky needles soluble 1 in 4 in water.

ℙ1 **Coninæ Hydrobromidum.** Fr. Cx $C_8H_{17}N.HBr = 208·112$.

Dose.—⅓ grain, increased to 2 grains (**0·02 to 0·12 Gm.**) in pill.

The hydrobromide of the liquid alkaloid ℙ1 **Conine** (*α-n* Propylpiperidine) *Syn.* **Coniine, Cicutine** $C_8H_{17}N = 127·184$. It was synthesised by Ladenburg. The base is soluble in alcohol, 1 in 80 of water, also in chloroform and acetone. *Dose.*—Similar to that of the salt which is in colourless crystalline prisms, soluble in water 1 in 2, nearly.

Incompatibility.—Conium preparations are incompatible with alkalies and preparations containing tannin.

Antidotes.—Stomach tube and emetic. Give tannic acid and wash out the stomach again. Stimulants are needed and employ artificial respiration.

Uses.—Conium and conine hydrobromide act as direct sedatives to the respiratory centre; in poisonous doses death is caused by asphyxia. Employed with advantage in all spasmodic affections, especially for whooping-cough and asthma; in neuralgia, epilepsy, and as a sedative in acute mania.

Ⓟ **Injectio Coninæ Hydrobromidi Hypodermica.** 1 grain in 20 minims. *Dose.*—1 to 3 minims (**0·06 to 0·2 Cc.**).

Ⓟ **Pessus Coninæ.** Conine ½ minim, Gelatin Mass 20 grains.

Ⓟ **Tinctura Conii.**

Dose.—½ to 1 drachm (**2 to 4 Cc.**).

We prepare this with Conium Fruit No. 40 powder, 1 in 5 of Alcohol 60% by percolation, and standardise to 0·1% Conine.

Ⓟ **Extractum Conii Liquidum, B.P.C.**

Dose.—5 to 15 minims (**0·3 to 1 Cc.**).

Conium Fruit 100 in No. 40 powder is exhausted with alcohol 60% containing 1·25% of acetic acid (33%), the last portion of percolate concentrated and mixed with the first 85 previously set aside, so as to produce a Liquid Extract "containing alkaloids equivalent to 1% of alkaloidal hydrochlorides."

Ⓟ **Extractum Conii,** Fr. Cx. *Extrait de Ciguë, Dose.*—Maximum single ¾ grain (**0·05 Gm.**) approximately.

A firm Extract produced by extracting the powdered fruits with 70% alcohol at 35° C., evaporating the liquor and treating the residual extract with water, evaporating the aqueous extractive, rejecting the portion not dissolved. We found an extract which we prepared, to contain 2½% alkaloids.

Ⓟ **Unguentum Conii.**

The author's formula is as follows: Extract of Conium, Fr. Cx. a sufficiency to produce 0·1% total alkaloids in the finished Ointment, the basis of which consists of Unguentum Lanolini. Gives relief in pruritus ani, and for painful fissures.

COTO CORTEX.

Dose, in powder, 1 to 8 grains (**0·06 to 0·5 Gm.**) 4 to times a day. Is imported from Bolivia. Paracoto bark is exported in place of true Coto bark—*N.O.* probably *Laurineæ.*

Botanical source of Coto Bark given as *Nectandra Coto* by Dr. Rusby. It seems probable that like the Cinchona genus there may be several allied species.—E. M. Holmes, P.J. i./23,240.

Account of Rusby's trip in the Amazon basin to determine the source of Coto bark.—C. W. Mablethorpe, P.J. i./23,238. C.D., 1923, p. 380. Possibly several species of Nectandra contain Cotoin.—Prof. Greenish, *ibid.* 381.

Uses.—For cholera, and especially the diarrhœa of phthisis, for night sweats, and for gout and rheumatism. It is rich in resins which give it a pungent taste.

Incompatible with Mistura Cretæ.

Extractum Coto Liquidum. 1=1 of bark.

Dose.—2 to 6 minims (**0·12 to 0·4 Cc.**).

Tinctura Coto, B.P.C.

Coto Bark bruised 1 Alcohol (90%) *q.s.* to 10.

Dose.—10 to 30 minims every 2 hours with mucilage and syrup.

Mistura Anti-cholerica *Royal Coll. Phys.* Form II. (L. ii./92,682).

Aromatic Sulphuric Acid 15 minims, Compound Tincture of Camphor 30 minims, Compound Tincture of Chloroform, Tincture of Coto, of each 20 minims, Syrup of Orange Flower 1 drachm, Peppermint Water to 1 ounce *Dose.*—1 ounce every 3 or 4 hours. This preparation has been found invaluable. Form I. will be found in the Xth Edition, p. 105.

℗ **Diarrhœa and Cholera Mixture.** (*Board of Health.*)

Aromatic Confection 9 grains, Aromatic Spirit of Ammonia 9minims Tincture of Catechu 30 minims, Compound Tincture of Cardamoms 18 minims, Tincture of Opium 3 minims, Chalk Mixture to 1 ounce =1 dose). The following (C.D.ii./07,357) are also of great benefit :—

℗ **Mistura Thielemani.** *Syn.* TINCTURA ANTICHOLERICA THIELEMANI. THIELEMAN'S KOLERADRAABER.

Average Dose.—30 minims (**1·8 Cc.**). Dissolve Peppermint Oil 3 in Alcohol 22 and add to Sydenham's Laudanum (Vinum Opii Crocatum *q.v.*) 10, Ipecacuanha Wine 25, Tincture of Valerian (1 in 5 of Dilute Alcohol) 40.

℗ **Tinctura Anticholerica Conradi.**—CONRAD'S KOLERADRAABER.

Dose.—Over 20 years, 40 drops ; over 5 years, 1 drop for each year. Must not be given to a child under 5 years.

Tincture of Opium (B.P. '98) 1, Tincture of Cascarilla and Camphorated Spirit of Ether of each 2, Bitter Tincture of Rhubarb 5.

[**Spiritus Ætheris Camphoratus** is Camphor 3, Spirit of Ether (1 in 4) 17. **Tinctura Rhei Amara** is Rhubarb 10, Cardamoms 1, Gentian 4, Alcohol (70% by vol.) 100, all by weight.]

Pulvis Cretæ Compositus, U.S.

Average dose.—30 grains (**2 Gm.**).

Prepared Chalk 30, Acacia 20, Sugar 50.

Cotoin.—*Dose.*—½ to 2 grains (**0·03 to 0·12 Gm.**) every 2 or 3 hours in pill or diluted mucilage. 4 grains have been used in dysentery.

A bitter principle, in yellow crystalline powder, slightly soluble in water, soluble in alcohol. Melting point, 130° C. The dust is irritating to the nostrils.

℗ CREOSOTUM. FR. CX.

Kreosotum, P.G.V., P. Austr., P. Helv., P. Dan.

Dose.—1 to 5 minims (**0·06 to 0·3 Cc.**), increased to 30 or even 60 minims, in capsules, or in cod liver, almond, or olive oil, or emulsified.

Soluble in alcohol, chloroform, ether, glacial acetic acid, fats and oils, and 1 in about 150 of water.

Creosote (*Off.*)—is a mixture of phenols–chiefly guaiacol and creosol.

Two kinds of genuine Creosote are met with in commerce—one from **Pinewood**, which is anhydrous and mixes perfectly with oil of turpentine, consisting chiefly of creosol $C_6H_3.CH_3.OCH_3.OH$: 1, 3, 4= 138·12 homopyrocatechin-methyl-ether (Morson's Creosote is representative of this class). Glycerin is miscible with Morson's Creosote in all proportions up to 2 of Glycerin to 1 of Creosote. Upon further addition of glycerin the mixture becomes turbid. Creosote

does not cause collodion to gelatinise when mixed with it in equal proportion. The other variety is principally from **Beechwood**, which contains Guaiacol, $C_6H_4.OCH_3$ OH=124·099 and is more soluble in water.

For composition of and tests for Creosote, see Vol. II.

Flavoring.—Emulsified, Glyl or Syl Pini excellent, Syl Lavandulæ and Syl Amygdalæ Amaræ are also good; Mistura Amygdalæ Composita, or Essentia Menthæ Piperitæ.

Uses.—Locally as a caustic. It is one of the most powerful deodorisers, antiputrescents, and antiseptics. It is used internally to correct fetor, given to check sickness, for diabetes, added to cod-liver oil for phthisis and applied externally in various skin diseases, and is put into the cavities of carious teeth. *Hypodermically* was administered in 10% solution in sterilised almond oil. Checks gastric fermentation and is an intestinal antiseptic in some forms of diarrhœa. For irritable trachea and congested larynx, causing troublesome cough, the inhalation of creosote from an oro-nasal or 'ozonic' inhaler is useful.

Two half drachms having been taken in error is recorded.

Incompatible with silver oxide (*q.v.*). Also with calcined magnesia and slaked lime.

Aqua Creosoti. *Syn.* Liquor Creosoti. *Average dose.*—2 drachms. Creosote 1 in 100 water freshly prepared.

Elixir Creosoti.—*Martindale.*

Dose.—1 to 2 drachms (**4 to 8 Cc.**) diluted at the time of taking.

Creosote 2 minims, Alcohol 90% 10 minims, Syrup of Pine (*q.v.*) and Simple Elixir, B.P.C., 1894, *a.a. p.aeg. q.s.* to 2 drachms.

Haustus Creosoti (Vic. Park) contains 3 to 30 minims in an ounce dose.

Mistura Creosoti et Potassii Iodidi.

Dose.—½ ounce (15 Cc.) every three hours until the temperature becomes normal.

Creosote ½ drachm, Potassium Iodide 1 drachm, Alcohol 2 drachms, Liquid Extract of Liquorice 3 drachms, Water to 6 ounces.

In the treatment of lobar pneumonia the above dose is suitable for adults; for children proportionate quantity. The antiseptic action of creosote limits the extension of the pneumonic process. The Iodide by stimulating cell action loosens the exudate. Combined, these drugs produce quieting effect on the heart, and diuresis. The Iodide reduces blood pressure. No particular local treatment employed. Results in 20 cases good. The author of the paper puts these results against Vaccine Therapy results.—B.M.J. ii./10,1611. See also E. W. Maitland, B.M.J. ii./18,464, but we know that stock vaccines are of great value.

The Potassium Iodide content, it is suggested, should be kept down. A dose of 2 to 3 grains with the Creosote 5 minims is a good expectorant, and depressant action is avoided.—'M.D.' B.M.J. i./22,334.

Pneumonia and influenza well treated, 10 minims gently rubbing into the right axilla with the finger repeated on the left axilla if required 10 minims at a time, also ½ minin *per os.* Reduces temperature.—J. E. B. Wells, B.M.J. i./19, 481.

Mistura Creosoti Composita.

Dose.—2 drachms every 4 hours for a child of 5 years.

Creosote 32 minims, Calcium Carbonate (precipitated) 128 grains, Potassium Iodide 16 grains, Mucilage Tragacanth *q.s.*, Saccharin 8 grains, Oil of Peppermint or Aniseed 5 minims, Water to 8 ounces.

In tuberculous peritonitis in two children, apparently hopeless cases, the above was useful. Tincture of Opium or Compound Tincture of Camphor added for relief of pain and diarrhœa if present. Petroleum Emulsion and Cod Liver Oil as further treatment. Abdominal tumours diminished and general health improved. Remarkable recoveries. The mixture has also been found very beneficial in phthisis.—H. Lawrie, B.M.J. ii./13,1433.

Oleum Morrhuæ cum Creosoto.

Dose.—1 to 4 drachms (**4 to 15 Cc.**). Contains 1½%.

In ulcerative colitis, Creosote 3 minims, with Cod Liver Oil 1 drachm thrice daily—Castor Oil having been previously given—increased by 1 drachm daily, until on the 4th day 12 minims with ½ ounce respectively are taken combined. Has proved useful.

* **Pautauberge's** (T.M. 242453) **Solution.**

Dose.—A tablespoonful (containing 2 minims of Creosote and 8 grains of 'Calcium Hydrochloro-Phosphate.')

Perles of Creosote. 1 or 3 minims in each, with oil, also **Capsules,** 3 and 5 minims, or more, with oil.

℗ **Creocarb Capsules.** Contain Beechwood Creosote 3 minims and Phenol ¼ gr. In the treatment of phthisis.

Pilula Creosoti :—*Martindale.*

Dose.—2 to 6 grains (**0·12 to 0·4 Gm.**).

Creosote 1, Curd Soap, in powder, 1. Digested on a water-bath in a wide-mouthed stoppered bottle. As prophylactic against dysentery, *e.g.*, by soldiers on march.

To make a pill containing Creosote 2 minims and Phenol 1 grain, use White Wax 2½ grains and Powdered Liquorice 1 grain. Incorporate the Phenol, Creosote and Wax with the powder gently and quickly.—P. Boa.

Spiritus Creosoti.

Dose.—1 drachm. Creosote 1, Alcohol 90% 40. Lessens cough and expectoration in chronic bronchitis and phthisis.

Vaselinum Creosoti :—*Martindale.*

1 of Creosote in 10, employing "*High Melting*' Vaseline.

Unguentum Creosoti.

Creosote 6 drachms, Yellow Wax 180 grains. Melt, and stir till cold.

F Used in psoriasis. Caution.—Should not be applied to the abdomen, face, or flexor surfaces of the limbs.

℗ **Vapor Creosoti,** T.H.

Creosote 80 minims, French Chalk 30 grains, Water to 1 ounce C.L.T.E. has Creosote 40 minims, Light Magnesium Carbonate 20 grains, Water to 1 ounce.

A teaspoonful in a pint of water at 140° F. Useful in chronic congestion of the larynx and trachea, and in ozœna, fetor of breath and syphilitic throats.

Abscess of lung. Creosote internally in doses up to ½ drachm, together with inhalations of Creosote and Iodine.—L. i./07,1021.

For phthisis, it is more sedative in its action if mixed with an equal volume of spirit of chloroform, 5 to 20 minims employed at one time.

℗ **Vapor Creosoti Compositus** (*Syn.* Inhalatio Iodi Composita L.H., Vapor Acidi Carbolici Compositus in XIVth Edition).

Creosote 2, Carbolic Acid 2, Iodine Tincture 1, Spirit of Ether 1, Spirit of Chloroform 2.

For early pulmonary tuberculosis inhalation of antiseptics from a "Burney Yeo" inhaler was recommended by Lees. *It must be continuous and in operation the whole of the* 24 *hours*, excepting meal times. The above solution is used: 6 to 8 drops dropped on to the sponge of the inhaler every hour during the day, and two to three times during the night if awake. Non-irritating, beneficial and does not cause hæmoptysis. Allays pyrexia and cough.

Should hæmorrhage occur, Yeo's suggestion to add turpentine should be remembered.—B.M.J. ii./09,1659.

The antiseptics make their way into the pulmonary alveoli and the slow absorption of the anæsthetic solvents in a dilute condition carry with them the antiseptics into the blood and by the blood stream to the tuberculous foci. The Alcohol used as one of the solvents must be considered as tonic and stimulating as also the Ether. The Chloroform is locally sedative and reduces cough.

Guaiacol, Phenol and Spirit of Chloroform, adding Turpentine when necessary, have also been used.

In *pneumonia* at the earliest possible stages of the disease, *vide* Pneumonia.—Therapeutic Index.

Vapor Chloroformi Compositus. L. H.

Chloroform 10 minims, Liquid Phenol 10 minims, Alcohol 90% 50 minims, glycerin 35 minims. Quantity for one inhalation: 60 minims.

Guttæ Cinnamomi Compositæ.

Creosote 2 drachms, Pine Oil 1½ drachms, Spirit of Chloroform 1½ drachms, Menthol 10 grains (or less), Cinnamon Oil 5 minims, Oil of Citronella may be added also or substituted for the Cinnamon. 10 grains of Menthol may be a little too pungent until patient gets accustomed to it. This combination used on a Yeo's respirator is not unpleasant as regards the penetrating odour ot the Creosote. The inhalation has marked effect in reducing cough—a matter of the utmost importance—it rests the larynx.—Dundas Grant.—L. i./11,262.

Note.—Dr. Grant now uses 3 drachms of creosote.

Solutio Creosoti Composita, Brompton H.

Creosote 1, Spirit of Menthol (20%) 1, Spirit of Chloroform 1, for inhalation.

Creosote Carbonate.—*Syn.* ✱Creosotal (T.M. 216421/1899). Patent 19074/1890 ***Expired.*** U.S. IX.

Dose.—5 to 20 minims (**0·3 to 1·2 Cc.**) or considerably increased.

A light-brown nearly odourless liquid, Sp. Gr. 1·165, insoluble in water, soluble in oils. **Capsules** contain 5 and 10 minims.

It contains the carbonates of guaiacol and creosol. Has been used in tuberculosis, bronchitis, and pneumonia. Breaks up in the alkaline intestinal juices.

Manufacture. — Pass a sufficiency of Carbonyl Chloride into a solution of Beech Creosote 124 in Sodium Hydroxide 40 in concentrated aqueous solution. The liquor separating is washed with weak alkali and then with water.

Pneumonia best treated by Creosote Carbonate 15 m. every 3 or 4 hours, Guaiacol Carbonate 5 grains better where tubercle suspected. A. Fletcher, B.M.J. i./19,799.

Creosote Valerianate.—*Syn* EOSOTE.

Dose.—5 to 10 minims (**0·03 to 0·06 Cc.**). **Capsules** 8 minims in each are made.

An oily liquid, soluble in alcohol, glycerin and ether; checks gastric fermentation and used for phthisis epidermically. Is not so toxic or corrosive as creosote.

Proposote. *Syn.* CREOSOTE PHENYL-PROPIONATE.

Dose.—10 minims (**0·6 Cc.**).

Insoluble in water and in dilute acids, but split up in presence of alkalis. Administered shortly after meals, it passes through the stomach without causing irritation. The creosote is liberated in the intestine. Useful in tuberculosis and bronchial affections, also in intestinal bacterial infections. Capsules contain 10 minims (equivalent to 5 minims of creosote).

Guaiacol (*Off.*). $C_6H_4.OCH_3.OH = 124·099$.

Dose.—1 to 5 minims (**0·06 to 0·3 Cc.**). U.S. has *average dose* 8 minims. This approximates the *max. single dose* of the FR. CX.

A colourless refractive liquid, a constituent of beech-wood creosote but is also made synthetically from pyrocatechin, in colourless crystals, melting at about 28° C. Sp. Gr. 1·116 to 1·14 (B.P. correction). *The crystals should be only dispensed when so ordered.* The crystals are official in **P. Belg.**

Solubility.—Both forms are soluble in alcohol, ether, oils, glycerin, slightly in water, with taste and odour resembling creosote.

Uses.—In phthisis, particularly in incipient stages, may be prescribed in capsules (Guaiacol Carbonate), or cordial, *e.g.*, Guaiacol 13·5, Tincture of Gentian 30, Alcohol (90%) 250, and Sherry to 1,000; two teaspoonsful two or three times a day in water—or in Mistura Guaiacol, *vide infra.*

Antiseptic and antipyretic. It is sometimes rubbed into or painted on the skin, covered by oiled silk; begin with 10 minims and increase to 30 or more; do not cover more than the space of the palm of a hand at a time.

Mistura Guaiacol, G.H.

Guaiacol 4 minims, Alcohol (90%) 5 minims, Glycerin 30 minims, Oil of Cinnamon 1 minim, Tragacanth Mucilage 1 drachm, Water to 1 ounce.

Mistura Guaiacol cum Quinina.

Dose.—½ drachm gradually increased to 2 drachms, well diluted with water, thrice daily after meals.

Guaiacol 30 to 40 minims, Quinine Hydrochloride 20 to 25 grains, Alcohol (90%) 2 ounces, Compound Tincture of Gentian 3 ounces, Water to 8 ounces. The small dose of Guaiacol thus given is increased by giving Guaiacol Carbonate in Capsules.—J. C. Voigt, L. i./13,607.

Pulmonary tuberculosis, highly satisfactory results with Guaiacol. Give in mixture as follows: Guaiacol 1 drachm, Alcohol (90%) 1 ounce, Syrup of Lemons 1 drachm, Spirit of Chloroform 2 drachms, Water to 6 ounces.

Dose.—½ ounce thrice daily. Increase Guaiacol by 2 minims each week until a dose of 12 to 15 minims is given thrice daily and continue for four months or more.—B.M.J. i./14,84.

Perles of Guaiacol contain 1, 2 or 3 minims, dissolved in oil. **Capsules** 2 and 5 minims, *best made with Guaiacol Carbonate* we find.

Pilula Guaiacol 1 to 3 grains crystal) require ⅛ grain Compound Tragacanth Powder per grain of Guaiacol with Glucose Syrup to mass.

Capsules of Guaiacol (Carbonate) 1 grain, **with Iodoform** 1 grain and Almond Oil 5 minims, are prepared for use in phthisis, also of Guaiacol ¾ grain, with Cod Liver Oil, 5 minims.

Injections of Guaiacol 5%, and **Iodoform** 1%, in sterilised olive oil, have been recommended in tuberculosis; said to lessen cough and expectoration, diminish number of bacilli in sputum, favour cicatrisation of cavities, and lessen fever and night-sweats, but Guaiacol so used is not free from danger.

Dose.—One, increased to three Cc., but better *per os.*

Durant's Injection. Guaiacol 5, Iodine 1, Potassium Iodide 10, Sterile Olive Oil 100. In pulmonary phthisis.

For tuberculous uveitis Guaiacol has been extolled. 1 Cc. of 1% Solution injected, but these subconjunctival injections are not approved by all.—A. W. Ormond, Pr. Jan. '13,267.

Vapor Guaiacol Compositus.

Guaiacol and Terebene of each 2, Menthol and Thymol of each 1, Spirit of Chloroform 3. Inhale 5 to 10 minims from an inhaler night and morning. Employed in phthisis.

Ⓟ **Fuller's Inhalant.** A.M.Ph. Assn.

Guaiacol 4, Menthol 2·5, Camphorated Tincture of Opium 125, Compound Tincture of Benzoin to 250. Sometimes Terebene 4 added.

Unguentum Guaiacol. Guaiacol 1, Lanolin Ointment (or other suitable basis) 5, useful in orchitis and mumps, and in tuberculosis.

Rheumatoid arthritis is treated with Guaiacol 1, Iodine Tincture 7, to be painted on the joints twice daily with a mixture internally of Ammonium Chloride 15 grains, Iodine Tincture 5 minims, Carbolic Acid 2 grains thrice daily.

Pigmentum Guaiacol.—Guaiacol 1, Olive Oil 1, Dissolve.

In eye diseases, *e.g.*, interstitial keratitis, irido-cyclitis, vitreous opacities, sympathetic ophthalmia and optic neuritis, Guaiacol found to be more *certain diaphoretic* than Pilocarpine. Was tried for reduction of temperature, but discarded owing to difficulty of limiting its action. Never used in more than 30 minim doses.

***Caution.*—Pigmentum Guaiacol R.N.H.** is Guaiacol 25 minims, Menthol 25 grains, Olive Oil to 1 ounce. For use in throat work.

In leprosy external and internal use of value. Used externally with a brush and covered with cotton wool or left exposed, the Guaiacol is rapidly absorbed. Pills 0·1 Gm. with Eucalyptol 0·04 Gm.—two morning and evening, gradually increased, until 10 pills (=1 Gm. Guaiacol) taken daily. Alkaline baths twice weekly, and substantial diet enjoined.—Sem. Medical, Jan. 18, 1911, per Pres.

Guaiacol Benzoas, Guaiacol Benzoate. — *Syn.* ✱BENZOSOL. (T.M. 97425) $C_6H_4.OCH_3.O.CO.C_6H_5$=228·166.

Dose.—4 to 12 grains (**0·25 to 0·8 Gm.**) in cachet.

Manufacture.—The patent 5366 (1890) method—***now expired,*** is misleading.

We found that heating Guaiacol crystals 12, with Benzoyl Chloride 15 at 150° C. till Hydrochloric Acid ceases to evolve, then pouring into 100 Cc. of 15% solution of Sodium Carbonate gave a theoretical yield.

In small crystals, almost tasteless, nearly insoluble in water.

Incompatible with alkalis. Useful in incipient phthisis (especially the diarrhœa of), and in diabetes mellitus. **Tablets, 5** grains. *Dose.*—1 or 2.

Guaiacol Camphorate.—*Syn.* GUAICAMPHOL.

$[C_6H_4.OCH_3.O]_2(CO)_2C_8H_{14}$ or $C_{24}H_{28}O_6$=412·344.

Dose.—5 to 10 grains in cachets or 5 grain tablets.

Soluble only very slightly in alcohol, insoluble in water; for night-sweats and diarrhœa of phthisis.

Guaiacol Carbonas (*Off.*), and majority of Pharmacopœias. *Syn.* ✱DUOTAL. $(C_6H_4.OCH_3)_2CO_3$=274·187.

T.M.: DUOTAL, 19,7371/1896. (Renewed 1910.)

PATENT 19074/90, now ***Public Property.***

Dose.—5 to 15 grains (**0·3 to 1.0 Gm.**), gradually increased, in cachets or capsules. (The Capsules keep well). **Tablets,** 5 grains.

Manufacture.—By passing carbonyl chloride into an alkaline solution of guaiacol until the liquid on addition of Hydrochloric Acid no longer precipitates Recrystallise from alcohol.

A white minutely crystalline substance, tasteless, and with slight odour, soluble in alcohol about 1 in 200, but soon crystallises out again with drop of temperature, insoluble in water, slightly in ether, but readily in chloroform and in benzene.

Uses.—In phthisis, improves appetite, and lessens cough, expectoration and night sweats, also in typhoid and for bronchitis and rheumatoid arthritis; In rheumatoid arthritis, both the subacute and chronic forms. It arrests the disease and diminishes size and increases movement of joint and relieves pain, by probably inhibiting growth of the specific organism in the intestinal tract, and combining with the bacterial toxins and assisting in their elimination. At first from 5 to 10 grains in cachets thrice daily increasing by one or two grains each week until each dose is 15 to 20 grains—to be continued at least twelve months. At the same time a mixture containing 10 grains of potassium iodide in each dose. Combine with tonics.—A. P. Luff.

Guaiacol as anæsthetic in nose, throat and ear operations.—Pres., May, '20, p. 202.

Guaiacol Cinnamate.—$C_6H_4O.CH_3O.C_9H_7O$=254·192.

Dose.—5 to 15 grains (**0·3 to 1 Gm.**).

In white granular crystals, insoluble in water. For intestinal phthisis and vesical catarrh. Splits up into its constituents.

Guaiacol Iodide.—*Dose.*—5 to 15 grains (**0·3 to 1 Gm.**). A brown powder insoluble in water, containing about 10% of Iodine used as an intestinal antiseptic, etc., and suggested in phthisis.

Note.—Guaiacol Iodide chemically would contain slightly over 50% Iodine. The above is a diluted preparation.

Potassium-guaiacol-sulphonate. FR. CX. Supp. II., Ph. Ital. IV., P. Jap. IV. ✱**Thiocol** (T.M. 219605).

$C_6H_3(OCH_3)OH.SO_3K = 242{\cdot}251$.

Dose.—15 grains (**1 Gm.**) thrice daily. Tablets contain 5 grains: Syrup 1 dram = 5 grains.

In colourless crystals with slight guaiacol odour, soluble in water, 1 in 6, slightly in alcohol. Contains 52% of guaiacol.

Has been recommended in phthisis. Large doses may be given in bronchitis and pneumonia, also for intestinal catarrh—M.P. 1907, Sept. 18, p. 320. See also Fr., Nov. 11,699 R. Martial, Ind. Med. Rec., June, 1913.

It passes unchanged through the body.—J. M. Fortescue-Brickdale, B.M.J. i./15,107.

Calcium-Guaiacol-Sulphonate. *Syn.* GUAIACYL. *Dose.*—10 minims (**0·6 Cc.**) of 5% solution or 1 Cc. of 10% solution subcutaneously. Local anæsthetic.

CUBEBA, U.S. (*Off.*)

Dose.—30 to 60 grains (**2 to 4 Gm.**) in cachets.

The dried unripe full-grown fruit of *Piper Cubeba* (*Piperaceæ*). The genuine—imported from Java—give a crimson colour with sulphuric acid, and are free from mace-like taste and odour.

Cigarettes of the powder are useful for catarrh and excessive bronchial secretion. It is sometimes added to Ferrier's Snuff, *q.v.*

Oleum Cubebæ, U.S. IX. *Dose.*—5 to 20 minims (**0·3 to 1·2 Cc.**).

Colourless, pale green or greenish yellow oil, with camphoraceous odour and taste characteristic of Cubebs. Soluble 1 in 20 in alcohol 90%. At least 60% should distil between 250° and 280° C.

Capsules of Cubeb Oil contain 10 minims. For combinations *v.* Oleum Santali. Used in bladder and urethral affections.

Suppositoria Cubebæ, 10 grains each for astringent effect.

Tinctura Cubebæ, 1 in 5 Alcohol (90%), (*Off.*). *Dose.*—½ to 1 drachm. In chronic bronchitis as an expectorant.

Flavoring.—Syl Aurantii Amari, Glyl Pini.

Oleo-resina Cubebæ (B.P. 1885).

Dose.—5 to 30 minims (**0·3 to 2 Cc.**).

U.S. IX. prepares by alcohol extraction. Deposits on standing; the waxy crystalline matter is to be rejected.

Trochisci Cubebæ, T.H. Marked 'C.B.' ½ grain each (U.S. ⅓ grain) with fruit paste. *Dose.*—1 every 3 or 4 hours.

Vapor Cubebæ cum Limone, T.H. Cubeb Oil ½ drachm, Oil of Lemon 10 minims, Light Magnesium Carbonate 20 grains, Water to 1 ounce. Has stimulating effect in chronic bronchitis.

CUPREÆ CORTEX.

Cupreine, an alkaloid, occurs with Quinine in Cuprea Bark, *Remijia pedunculata* and other species.

It is allied to Quinine. Its salts have been similarly employed. It can be converted into Quinine by treating with Sodium in Methyl Alcohol Solution and heating the Solution with Methyl Iodide.

Several Cupreine derivatives have been recently used:—

Quinine (*Syn.* Methyl Cupreine) is $C_{20}H_{24}N_2O_2 = 324{\cdot}308$.

Cupreine is $C_{19}H_{22}N_2O_2 = 310{\cdot}287$.

Hydrocupreine is $C_{19}H_{24}N_2O_2 = 312{\cdot}303$.

Methyl Hydrocupreine (*Syn.* Hydroquinine) is $C_{20}H_{26}N_2O_2 = 326{\cdot}324$.

Ethyl Hydrocupreine (*Syn.* Optochin) $C_{21}H_{28}N_2O_2 = 340{\cdot}345$.

Methyl-Hydrocupreine Hydrochloride. *Syn.* HYDROQUININE HYDROCHLORIDE, $C_{20}H_{26}N_2O_2.HCl.2H_2O=398{\cdot}824$.

Contains 2H atoms more than Quinine.

Dose.—Intravenously 4 to 12 grains (**0·25—0·8 Gm.**) for adults—for malaria. For whooping cough in young children up to 6 months, $\frac{1}{3}$ to $\frac{3}{4}$ grain (**0·02—0·05 Gm.**), 6 to 12 months, $1\frac{1}{2}$ grains (**0·1 Gm.** from 2 to 14 years, $1\frac{1}{2}$ to 8 grains (**0·1 to 0·5 Gm.**) intramuscularly.

When heated with strong Hydrochloric Acid it loses a Methyl group and is converted into Hydrocupreine, $C_{19}H_{24}N_2O_2$.

Soluble.—1 in 8 of water (by our experiments). Destroys parasitic protozoa and has been advised by intravenous injection in malaria and trypanosomiasis. It gives the usual reactions for Quinine, excepting in not reducing permanganate.—L. ii./12,1161; B.M.J. ii./13,25.

Ethyl-Hydrocupreine. *Syn.* ✱OPTOCHIN BASE.

$C_{21}H_{28}N_2O_2=340{\cdot}345$.

Dose.—3 to 4 grains (**0·2 to 0·25 Gm.**). Max. dose during the day 15 grains (**1 Gm.**). Not to be given on empty stomach.

A whitish amorphous powder with bitter taste. Almost insoluble in water, soluble in alcohol, ether, chloroform and dilute acids.

Uses.—In pneumonia and malaria.

The bacteria in pneumonia are destroyed by Ethyl-hydrocupreine and even the blood drawn of patients so dosed will destroy pneumococci—our only instance of specific drug therapy in acute general bacterial disease.—Prof. W. E. Dixon, B.M.J. ii./22, 410.

In treatment of pneumonia visual disturbances can be safely avoided if *optochin base* is administered in single doses of not more than 3 grains (0·2 Gm.)every four hours, day and night: the drug should not be administered longer than for three days, so that a total day's dose of 18 grains (1·2 Gm.), and a total dose for the whole period of 54 grains (3·6 Gm.) should not be exceeded. A regular milk diet should accompany the medication. If the slightest visual disturbance occur, optochin should at once be stopped.

For children the dose of the base should be much less—at least a quarter or half the above figures.

Unguentum Ethyl-Hydrocupreine 1% in White Soft Paraffin must be freshly made. Efficiency decreases in 3 to 4 days. Used in pneumococcal and gonorrhœal eye affections. *Vide infra.*

Ethyl-Hydrocupreine Hydrochloride. *Syn.* ✱OPTOCHIN (T.M. 356220) HYDROCHLORIDE, $C_{21}H_{28}N_2O_2HCl.=376{\cdot}813$.

Dose.—3 to 4 grains (**0·2** to **0·25 Gm.**). This dose should be given with caution. The *base* (*antea*) should be employed in pneumonia. The hydrochloride may cause grave visual disturbances.

A white crystalline powder soluble in water.

Uses.—Though given internally in some cases (it has been proved effectual in treatment as a prophylactic of common colds), it is mostly used locally in solution 1 or 2% in eye affections. Its use is at first painful.

Ulcus corneæ serpens has been treated with a 1% **Ointment** (made with the base) or a 1% or 2% **Solution.** A pad of sterile wool or gauze is soaked in the solution and then left on the ulcer for 5 or 10 minutes. After this the 1% solution is *instilled* into the eye every hour or so during the day or the

ointment applied 5 or 6 times per diem. *Note.*—Solutions should be freshly prepared. They decrease in efficiency after 3 or 4 days.

In conjunctivitis gonorrhoica, and photophobia accompanying eczematic conjunctivitis, scrofular ophthalmia, and keratitis has also proved useful.

Pneumococcal meningitis treated by ½ grain doses given intrathecally, together with anti-pneumo serum. One case, with Optochin alone, did not respond favourably.—C. Worster-Drought, M.P.C. June 14/22,514.

Inhibits pneumococcus in dilution 1 in 1,000,000.—G. T. Langley, L.i./24,13.

CUPRUM.

Cu = 63·57.

Antidotes to Copper Salts.—Stomach-pump, emetics white of egg and milk. Hot fomentations to the stomach, barley water, morphine or laudanum to relieve pain.

Colloidal Copper —*see* **Colloidal Metals.**

Copper (Metallic) as an antiseptic for water, milk, etc., see Vol. II.

Incompatibles with Copper Salts.—Alkalis and alkaline carbonates, also preparations containing tannin and iodides.

Cupri Acetas Neutralis. $(CH_3COO)_2$ Cu, H_2O=199·654.

Dose.—$\frac{1}{12}$ to ½ grain (**0·005 to 0·03 Gm.**).

Dark green crystals. Applied to ulcers acts as a stimulating caustic.

Soluble 1 in 15 approximately of water; only slightly in alcohol.

In tuberculosis has been given with Sodium Phosphate 1 grain, Tragacanth Mucilage ½ ounce, or as **Pilula Cupri Acetatis,** $\frac{1}{6}$ grain in each with Sodium Phosphate 1 grain, Liquorice Powder and Glycerin *q.s.* (*Cf.* **Colloidal Copper Phosphate.**) The fatal dose *per os* is said to be 154—184 grains, and 154 to 308 grains of the Sulphate.

Cupri Subacetas. *Syn.* **Verdigris, Aerugo.**

Is usually of indefinite composition, principally $[(C_2H_3O_2)_2Cu + CuO + 6H_2O]$ = 369·304, and only partly soluble in water. Occurs in greenish partly crystalline powder.

Linimentum Æruginis. Ph. Lond.

A decoction of verdigris, vinegar and honey is employed in veterinary work

St. G. H. has **Gargarisma Æruginis** 1 grain in the ounce with honey and glycerin.

Cupri Citras. $C_3H_4Cu_2O_7 + 2\frac{1}{2}H_2O$=360·242.

Greenish powder slightly soluble in water.

Unguentum Cupri Citratis. *Syn.* **'Cuprung,'** is supplied 5, 10, 15, 20 and 25% strength for use to ulcerations and granulations on the eye-lids. R.O.H. has 5%. C.X. 4½% approx.

* **Cuprentum** (T.M. 364414).

An ointment containing 5% of copper citrate.

Cupri Oxidum. CuO=79·57.

Is supplied commercially as 'precipitated' by adding Caustic Alkali to Cupric Sulphate solution, washing and drying, also 'granulated' by heating to partially fuse.

Cupri Sulphas. $CuSO_4$, $5H_2O$ = 249·71.

Average Dose.—¼ to ½ grain (**0·016 to 0·03 Gm.**); as astringent ¼ to 2 grains (**0·016 to 0·12 Gm.**); as emetic 5 to 10 grains (*Off.*).

Blue Crystals. ***Soluble*** in water 1 in 3½, in glycerin 1 in 2 (but may crystallise out again); insoluble in alcohol.

Uses.—Given internally in very small doses for severe diarrhœa and cholera, usually combined with opium (R.F.H. Pill ½ grain of each), and has been tried as rectal injection also for internal hæmorrhage and intestinal ulcers. ***Rapid Emetic*** for narcotic poisoning, three or four grains in water every few minutes until vomiting occurs. Also suitable for acute phosphorus poisoning.

Locally in eye affections (trachoma) as stimulant and for gleet.

Membranous colitis in children has been treated by injection of solution of 4 grains to the ounce with a little opium added.

In dry skin affections, and in tubercular tendencies, $\frac{1}{10}$ grain doses thrice daily, appear to act like arsenic, and are better tolerated.

In pyorrhœa alveolaris the gums are 'packed' with copper sulphate, and the patient directed to swab the gum with saturated solution of tannin in Eau de Cologne; the tartar is frequently removed.—Smale and Colyer.

Erosion in chronic endometritis has been treated by scarification and bathing with 7% copper sulphate solution.

Actinomycosis and blastomycosis have been treated by internal administration and irrigation with 1% solution. In syphilis treatment with copper sulphate and potassium iodide may prove useful.

Actinomycosis. Treated by injection of 1% Copper Sulphate Solution every few days, until softening of the infiltration occurs. For small lesions a few Cc. If extensive, the first injections are given under anæsthetic. Abscesses are opened and scraped and 40 to 100 Cc. of ¼ to ½% injected. Destruction of the fungus claimed.—B.M.J.E. ii./22,42.

Ionisation of copper, *vide* Iontophoresis. *Bactericidal Action, e.g.*, for purifying water. *Vide Vol. II.*

Guttæ Cupri Sulphatis, R.O.H. 1 or 2 grains to the ounce. Suitable as a lotion for gleet. For styes epilate the lashes affected and use a 1 in 100 lotion ten to thirty times a day. The lashes will grow again.

Copper Points, contained in turned wood holders, are useful for eye and intra-uterine medication.

Alibour Water.

Copper Sulphate 2½ drachms, Zinc Sulphate 9 drachms, Camphor 1 drachm, Powdered Saffron ½ drachm, Water 40 ounces.

Diluted with five or six times its volume of water, useful as a wet dressing in eczema.—M.P.C. i./12,8.

Ammonio-Cupri Sulphas. *Syn.* Cuprammonium Sulphate, $CuSO_4.4NH_3.H_2O = 245{\cdot}774$.

Dose.—½ to 1½ grains (**0·03 to 0·1 Gm.**), with Laudanum after meals.

Blue crystals soluble in water. Used in nervous affections. Lethal dose of this salt is stated to be equivalent to 0·05 Gm. of Copper per kilo body weight. Subcutaneous injection of equivalent in strength to 0·6 to 0·7% Copper tried in mouse carcinoma with promising result.—B.M.J. ii./13,222.

Cancer of the uterus claimed to have been cured by intramuscular (intragluteal) injections of a 1% Ammoniated Copper Sulphate Solution (exact formula not given). The Copper is thought to be reduced and precipitated as suboxide by the glycogen of the neoplastic cells which in consequence lose their vitality.—L. Manara, L. ii./15, 1205.

Cupri Chloridum, Cupric Chloride $CuCl_2+2H_2O=170{\cdot}522$.

Dose.—$\frac{1}{4}$ to 2 grains (**0·016 to 0·12 Gm.**). Use similar to Copper Sulphate. Greenish very deliquescent crystals.

Lapis Divinus. R.O.H. Cuprum Aluminatum P.G.

Potassium Alum, Copper Sulphate, and Potassium Nitrate, of each 1 part are fused together. Camphor equal to $\frac{1}{50}$ of the whole previously mixed with an equal weight of Alum is added and incorporated, and the mixture run into moulds to form pointed sticks. (G.H. has less camphor.)

P. Jap. adds Camphor 1 to 10, each of the other ingredients previously fused.

'Brass Paste.' Formed by combining Basic Copper Sulphate 86 with Basic Zinc Sulphate 14.

For cutaneous and other forms of tuberculosis stated to be quite innocuous—application to the conjunctiva of the everted eyelid resulted in the removal of all tuberculous tissue in a case of 20 years' duration.

A fluid preparation "BRASS OIL" or "BRO" applied on gauze also used. Further PICRIC BRASS PASTE containing 1% of Picric Acid found more penetrating.—H. A. Ellis, L. i./10,415.

Copper Alanine, *Syn.* **Copper Amino-propionate** $(CH_3.NH_2.CH.COO)_2Cu=239.712$. *B. typhosus* and colon organisms are less resistant than *B. tuberculosis* to copper salts. As copper salts have a low toxic value in man especially when given *per os*, inorganic salts of Copper might be more widely used to destroy micro-organisms. Therapeutically Copper salts have been used in inoperable cancer. They exhibit a specially high toxicity toward protozoa and might possibly be useful in combating dysentery.

Copper Alanine is soluble in blood serum—a matter of importance. It does not precipitate egg white, milk or solutions of caseinogen. *Dose* of 0·00013 Gm. produced no effect in mice. 3 Cc. of 1 in 300 solution tolerated by rabbits. 2 Cc. of this strength (commencing with 1 Cc.) have been given in inoperable cancer of the breast, without local or general inconvenience.

Various low animal organisms were experimented on. *Haematococcus* which lies on the border between animal and vegetable kingdoms, lethal effect was seen in 20 minutes with solution of strength 1 in 50,000 and 1 in 100,000 Copper Alanine. *Paramœcium* was killed with 1 in 100,000 in 13 minutes. Strong effects also observed on amœbæ.—J. A. Shaw-Mackenzie, Med. Press July 19, 1916. See also Proc. Phys. Soc. Jany. 27, 1917, Jl. Physiology, Vol. LI. and B.M.J. i./20,104,174.

Copper Sodium Tartrate.

This we have prepared in the form of a blue crystalline powder containing 15·75% metallic Copper. It has the advantage of being soluble in water to the extent of about 1 in 2. Suggested for investigation in protozoal diseases.—W. H. M. Oct. 1923.

Cuprocian, a double cyanide of Copper and Potassium, intravenously in tuberculosis. Experiments on guinea-pigs showed the lethal dose to be 3 mgr. per kilo, the curative dose for these animals being 1 to 2 mgr. per kilo every 3 or 4 hours. Copper salts stimulate growth of fibrous tissue and cyanides are better tolerated than other Copper salts, and do not coagulate Albumen. Further research proceeding.—L. ii./21,1018.

DECOCTA.

Decoctions of drugs are usually prepared 5% (unless otherwise stated) by boiling the drug in coarse powder with distilled water for 10 minutes and straining. If necessary a few drops of Chloroform or Formaldehyde will preserve fresh decoctions for a reasonable period of time. For various decocta consult index. *The strengths of decoctions of powerful substances should be specified by the physician.*

Decocta Concentrata are prepared commercially as a general rule '1 to 7.' They should contain at least 20% Alcohol—as a preservative. Fresh decoctions are preferable.

Ⓟ DIGITALIS FOLIA.

Dose.—½ to 2 grains (**0·03 to 0.12 Gm.**).

Fr. Cx.—*Maximum single dose* 3 grains, *maximum during* 24 hours 15 grains approx.

The dried leaves of *Digitalis purpurea* (*Scrophulariaceæ*) or foxglove, collected from plants commencing to flower.

Powdered drug (leaf of the second year) to be used *entire*.—F.I.—(*Off.*) and Fr. Cx. adopted.

Assay of Digitalis *and its preparations both chemically and physiologically is fully dealt with in Vol. II. q.v.*

The International Conference on Biological Standards (July 1923), fixed on a preparation of dried leaves as best; it contains all the active principles. In 95% of cases a total dose of 1·5 Gm. per 100 lb. body weight, during some days, produced definite therapeutic effect.—B.M.J. i./24,715.

As a result of experiments which we made, we believe that Digitalis leaves *should be collected from plants grown in a dry, sunny situation* —preferably after a spell of dry weather. We found that plants grown in the sun provided leaves which were more active, weight for weight, than the larger leaves of plants cultivated in the shade. The effect of increased sunlight in content of active principles has been noted in other drugs, *e.g.*, Belladonna.—*See* "**Digitalis Assay**" by W. H. Martindale (H. K. Lewis), 1913.

For Digitalis Seeds *see Vol. II.*

Uses.—Valuable heart tonic and stimulant diuretic in pulmonary œdema and dropsy. Simultaneous purging is said to be a useful adjuvant to treatment of cardiac disease with digitalis.

Much discussion has taken place at the B.M.A. Meetings and elsewhere on the effect of Digitalis, and the value of the preparations. The following is a résumé:—

Digitalis has a narrowing influence upon the arteries. Further investigation will show which part this vascular influence plays and how far its occurrence may be provoked or avoided in different cases. Acting on the vagus it pulls the reins of the heart. Acting on the heart muscle it is a most useful whip, at the same time providing it with food by bettering the circulation. Slowing the heart, it makes it regular also. This slowing gives the heart an opportunity of resting, so secondarily improving contractility, conductivity and excitability. By primary action it increases its strength, regulates its rhythm by depressing excitability and conductivity. In large doses it may increase excitability causing extra-systoles, perhaps diminish contractility, by causing long pauses do harm to the circulation. All these influences vary according to dose, form in which it is given and the conditions of the heart. The question is just how is it possible to build up a rational use of Digitalis at the bedside. It may be tried with success in every case where the condition of the heart is the cause of a bad circulation or troublesome symptoms. In doubtful cases give small doses. It should be given a fair trial in every case—especially in the form of powdered leaves.—B.M.J. ii./10,1600.

J. Mackenzie lays stress on determination of the '*rest-power*' of the heart and the '*work power.*' With the patient in bed in comfort, with circulation maintained, the rest-power is considered intact; if, however, evident signs of inefficient circulation, *e.g.*, dropsy, dyspnœa,

orthopnœa, then there is exhaustion of rest-power. The work-power is the function of the heart which enables it to increase its force when an effort is made. The amount varies with each individual. As standard by which to test this work-power one takes the amount of exertion the individual can take with comfort. The first evidence of heart failure is the premature exhaustion of the work-power. Great reliance is placed on the *B.P. Tincture* in preference to the Glucosides. The amount of the drug requisite to produce the first physiological effect is noted, and the quantity that maintains the heart in the condition best fitted to carry on the circulation efficiently. It may be that a given amount slows the pulse from 100 to 60 beats per minute, and coincident with the slowing there is improvement in patient's condition. If pushed further there may be still further slowing, but there may be untoward effects—thumping of the heart, breathlessness, etc.,—the dose is gradually reduced to a point to maintain the greatest comfort.—B.M.J. ii./10,1606.

Referring to the above paper H. H. Turnbull reports that giving 15 minims 4 times daily it was found that the average quantity taken before symptoms were produced was about 6 drachms, though cases varied from about $3\frac{3}{4}$ to $11\frac{3}{4}$ drachms. As to time required to produce full effect this varies. If rapid action was desired large doses—up to 2 drachms of Tincture *per diem* were given and with this, sickness (sign of full dose) and beneficial cardiac effects can be produced in 36 to 48 hours. If only 1 drachm *per diem* be given a period of 4 to 8 days is usually required to produce satisfactory result. Cardio-vascular effects, heart block, extra-systoles, action of dilatation and febrile heart cases are considered. 'Full doses are necessary to produce effects of the drug and unless it is pushed no result may be obtained in cases which would at once react to large doses.' No danger in pushing the drug if type of case is taken into consideration and result watched. In most cases the nausea was the limit sign determined by patients, and the only cases likely to show bad effects are those with damaged auriculo-ventricular bundle in whom heart-block may result. 15 minims of the Tincture *t.d.* has been given to out-patients with excellent results. Raised blood pressure is no contraindication to the use of Digitalis, and is often due to some secondary effect of the heart failure.—B.M.J. ii./10,1608.

THE CHOICE OF A DIURETIC.—Digitalis when given in suitable cases is a safe and efficient promoter of diuresis, but the kidneys must be capable of responding to its action which is by causing contraction of peripheral blood vessels—those of the kidney excepted—and increasing the force of the cardiac systole. It therefore raises blood pressure and forces more blood through the kidneys. In renal disease, however, the blood pressure is often raised already, and to raise it still further is to force upon diseased organs which are already greatly overtasked an amount of additional work, which, in their crippled state, they cannot perform. Other drugs belonging to this group are Strophanthus, Convallaria, Strychnine and Squill. Digitalis, being a cumulative drug, if continued too long without a pause, when used as a diuretic even in moderate dose, may begin to produce signs of depression.—Eustace Smith, B.M.J. i./11,289, *et seq.*

Considerable delay occurs before Digitalis (and Colchicum) produce their effect even after absorption. It is not perhaps until several hours after introduction of the first dose that the patient is under the maximum influence. This is the reason why the treatment of pneumonia by cardiac tonics is commenced early to assist heart's action in event of it beginning to fail.—P.J. ii./11,15.

In certain cases of Bright's disease, when dyspnœa is present the symptoms may be successfully combated by means of Digitalis, or Ether, by stimulants, and by expectorants.—Tirard, Clin. J l., April 5/11, 401.

A series of observations on the effect of Digitalis and other drugs, 1 to 2 drachm doses of the Tincture given daily until some definite effect obtained. Tables of cases. Variation in action and effect, due to nature of lesions rather than to any differences in the drugs. Cases of auricular fibrillation responded well unless pyrexia present, or unless there were marked fibrotic changes in the heart muscle. Cases without auricular fibrillation rarely showed marked improvement.—F. W. Price, B.M.J. ii./11,810 ; L. ii./11,506.

This authority finds, contrary to general expressed belief, that Digitalis does not raise blood pressure in man by constricting the peripheral vessels, and there is no risk in giving it in case of those suffering from degeneration of the blood-vessel walls.—B.M.J.ii./12, 689 ; ii./13,671 ; L. ii./12,460 ; ii./13,810. He states further that there is no essential difference between Digitalis, Squill and Strophanthus in the action on the heart, but the last two showed considerable variation in regard to dosage. Digitalis is more certain in effects. Aconite had no effect upon the pulse rate. Not in favour of the so-called alleged active principles of Digitalis.—F. W. Price, B.M.J. i./13,484.

Withering (1775) advocated the use of Digitalis as having a power over the motion of the heart. It was to be continued ' until it either acts on the kidneys, the stomach, the pulse or the bowels.' Atropine largely fulfils the want of a remedy (absent at that time) ' to counteract the effects of Digitalis if inadvertently the doses be presented too largely, too rapidly or urged to too great a length.' Digitalis cannot influence heart-rate in presence of febrile stimulation. It has found its greatest successes in uncomplicated mitral regurgitation associated with the general evidence of cardiac failure.

James Mackenzie in the issue of ' Heart,' dated Aug. 31, 1911, records results of use in 40 cases. Of these 20 had mitral stenosis, one was described as ' mitral,' 10 as ' mitral and aortic ' disease, two as ' aortic ' and the rest a miscellaneous group containing cases of paroxysmal tachycardia, bradycardia and emphysema. 10 of the mitral stenotic cases responded well to the drug, 8 did not. Of the mitral and aortic cases only one seems to have responded ; neither of the two ' aortic ' cases was notably affected, while in the miscellaneous group 4 improved and 3 did not. The general conclusion was that ' cases of auricular fibrillation are more readily and markedly affected than cases with normal rhythm,'—*i.e.*, the form of irregular heart usually associated with mitral disease, especially in younger subjects who have suffered from rheumatic fever, and in whom the cardiac muscle is fairly sound, respond most easily to the drug. It is thought that the diuretic effects of Digitalis may be observed without any perceptible change in the heart. The Tincture was mostly used in dose of 15 or 20 minims three or four times a day ' until some

definite reaction was obtained.' Aconite, long regarded as a retardant of cardiac action was quite inert in medicinal doses. Strophanthus though acting well in regulating irregular hearts was never seen to succeed when Digitalis had failed. Atropine was potent in accelerating some hearts retarded by the action of Digitalis.—Leader, L. ii./11,956; see also B.M.J. ii./11,869.

Digitalis in non-valvular heart disease. Reliance is placed on a good tincture rather than the so-called pure principles of the drug. Digitalis more certain than Strophanthus or Squills. Tinctures should be dispensed *as such* or only with alcoholic preparations.

The action of Digitalis is slow—rarely is any distinct change seen before four days. For more rapid effect Strophanthin intravenously $\frac{1}{250}$ to $\frac{1}{100}$ grain.—Cushny, B.M.J. ii./12,685 *et seq.*

A case of auricular fibrillation in pregnancy. Patient had an intolerance to Digitalis. Nausea and vomiting were caused by it, but she became more tolerant to it, and on one occasion took 11 drachms before feeling sick. On several occasions when the heart was beginning to fail it could be definitely ascertained that the amount of urine was decreasing. With the administration of Digitalis the amount increased—sometimes to as much as 90 ounces. In this patient the effect of Digitalis was to slow the pulse, improve the pulmonary condition and sometimes to promote diuresis. Digitalis was given just before the child was born—which occured after the full effect of the drug was established.—C H. Miller, L. ii./12,1218.

Emetic action of Digitalis. It is impossible to regard Digitalis as emetic by irritation of the gastric mucosa—vomiting caused by stimulation of the "vomiting centre" in the medulla. If general clinical experience should confirm this, vomiting after Digitalis will be regarded not so much as a check to the further administration of Digitalis, but as an indication that adequate quantities of the drug have been absorbed.—L. ii./13,1014.

Rheumatic heart of children, Digitalis in.—G. A. Sutherland B.M.J. ii./19,50.

Theocin in conjunction with Digitalis—*v.* Theocin.

In treatment of aortic incompetence Digitalis is not advised. Success with Nitroglycerin. G. Evans records on the other hand definite improvement from its use with increase in urine elimination. —L. ii./16,249.

Digitalis and Atropine. Action on the peripheral circulation.—I. Harris, L. i./21,1072.

Digitalis requires *at least 6 hours for complete absorption after oral administration* and is destroyed or eliminated very slowly, so that if repeated doses are given at about six-hourly intervals the administration may be stopped at first sign of intoxication when there is little of the drug to be further absorbed and no chance of severe toxic effects developing. In this way the maximum beneficial effect is obtained some days as a rule after the administration is commenced. Digitalis was given by the '**Rapid Method**' using doses of $1\frac{1}{2}$ drachms, 1 drachm and $\frac{1}{2}$ drachm of the tincture at intervals

of 6 hours. In auricular fibrillation with rapid ventricular rates and urgent symptoms, prompt slowing and clinical improvement resulted. Cases with normal rhythm are not suited for the method. —F. R. Fraser, L. ii./22,703.

Professor Fraser's method of producing rapid effect by oral use of digitalis was described as far back as 1875 by G. W. Balfour. —Harrington Sainsbury, L. ii./22,885.

Cardiac failure. Digitalis must be pushed to full legitimate limit. When it is consequent on fibrillation of the auricle, digitalis gives its dramatic results. Strychnine, alcohol and camphor doubtful stimulants. There are very few specifics. A general account of the subject which will repay further study.—J. Hay, B.M.J. ii./22, 899.

Discovery of a new Digitalis body with true Digitalis action, capable of being eliminated from a cat within a few hours of its intravenous injection.—Jl. A.M.A. 1923,1072, per P.J. i./23,456.

Cumulative Action.—This has been dwelt upon in the past. Clinicians hold that in the case of the *Tincture* it may be ignored, especially in view of the customary procedure nowadays to give a large initial dose.

It is questioned, however, whether more than 2 maximum doses should be given during 24 hours.—L. ii./10,575.

Irritant effect to the renal epithelium may be caused by Digitalis as the appearance of blood and albumen in the urine of animals after large doses shows.—Cushny, L. i./17,442.

Antidotes.—After emetics give gallic or tannic acid, camphor, nitro-glycerin, coffee or tea, also ether or alcohol. Aconitine $\frac{1}{120}$ grain hypodermically to be repeated in $\frac{1}{2}$ hour if heart action improves. Atropine 1/200 to 1/100 grain hypodermically is advised instead, by some. Patient should lie down until recovery.

Incompatible with preparations of cinchona and with lead acetate, also with iron salts (but the blackening is preventable by citric acid) and with iodine and potassium iodide.

Ⓟ **Extractum Digitalis.** Fr. Cx. Dried leaves extracted with 70% Alcohol, evaporated to soft extract.

Ⓟ **Infusum Digitalis** (*Off.* and B.P. 1898). About 1 in 143.

Dose.—2 to 4 drachms **(8 to 15 Cc.).**

According to recent research this is an active preparation.—P.J. i./01,699; i./13,403; but of course it does not keep.

In use it may well be combined with some vasodilator.

U.S. IX.—Digitalis 15, Boiling Water 500; infuse one hour, strain, and add Cinnamon Water 150, finally cold Water *q.s.* to 1,000.

Ⓟ **Acetum Digitalis, Ph. Ned.,** Digitalis Leaves 1, Dilute Acetic Acid (6%) 9, Alcohol (90%) 1, Macerate 5 days.

Ⓟ **Fluidextractum Digitalis, U.S. IX.** 1=1 by percolation with alcohol 75% approx. Biologically assayed., *cf* Digitalis, Vol. II.

Average dose.—1 minim **(0·05 Cc.).**

This is stated to deteriorate at the rate of 11% per annum. Ⓟ **P. Dan.** has also an 'Extractum Fluidum' 1=1.

Ⓟ **Digitalone.** *Dose.*—Hypodermically 8 to 15 minims (**½ to 1 Cc.**). *Per os* 15 to 30 minims (**1 to 2 Cc.**) cautiously increased. Is practically $\frac{1}{10}$ the strength of the U.S. preparation. Contains chloretone as preservative and 'anæsthetic.' Physiologically standardised.

Ⓟ **Tinctura Digitalis.** (*Off.*). 1 in 10 of 70% Alcohol=F.I., B.P. 1898 was 1 in 8 of 60% alcohol.

Dose.—5 to 15 minims (**0.3 to 1 Cc.**)

Frequently single doses of as much as 1½ drachms are given. Large single doses in many cases preferable to repeated small doses.

U.S. IX. 1 in 10. The spirit strength has been *increased.* It is now 70% as *Off.* Biologically assayed, *cf.* Vol. II.

Fr. Cx.=F.I. max. single dose, 25 minims; max. during 24 hours 90 minims approx.

Physiologically Standardised Digitalis Tincture. *Dose.*—5 to 15 minims, is of strength 0·75 Cc.=Minimum Lethal Dose per 100 Gm. of frog.

PHYSIOLOGICAL EXPERIMENTS which we had specially conducted for us (1913) would indicate that there is only a slight falling off in strength in 12 months. Indeed, we were able to demonstrate that a tincture ***12 Years*** old was quite up to the standard —this was confirmed by physiological test.—*cf.* L. i./13,77. *We deal with this matter more fully in Vol. II.*

Digitalis Leaves of good quality as a rule do not deteriorate (contrary to many opinions) or only with extreme slowness—at a rate probably not exceeding 1½ to 2% a year. The same holds good regarding Pharmacopœial (U.S.) preparations made with a menstruum containing at least 50% Alcohol. The Acetic Fluid Extract is worthless. The conclusions are based on physiological examinations on cats and frogs. A Fluid Extract 30 years old, found to be 32% more active than average of 13 present day specimens of commerce. —R. A. Hatcher and C. Eggleston, Am. Jl. Ph., May, 1913.

Maceration for 24 hours with ½ ounce of hide powder to the pint is said to detannate this tincture.

There is much divergence of opinion amongst medical men as to the relative values of the Tincture and the freshly made infusion. In an investigation comparing Alcoholic Tinctures and water-soluble glucosides from Digitalis, E. Berry found the latter gave the most desirable therapeutic effect. Details for preparing an aqueous solution of glucosides free from Digitoxin and Saponins.—P.J.ii./15,783.

There is *no essential difference between amounts of saponin bodies present in tincture and infusion* of Digitalis made from equ al weights of the leaf, and therapeutic doses of Digitalis do *not contain enough saponins* to induce any undesired effects.—Weiss & Hatcher, Jl. Am. Ph. Assn., 6, 1921, abst. C. D. June 24/22,809.

Large doses of Tincture. A prescriber states he gives even ½ drachm quantities. Necessity of initialling.—P.J. ii./22,301. See also *ibid.* 322,354, also interesting note from F. Beddington, champion sculler, *ibid.* 374. The latter took 1 drachm half an hour before a race without ill effect.

In aortic disease, when compensation fails, bold doses, *e.g.*, 15 minims, every four hours, with safety.—B.M.J i./07,611.

Bronchial constriction following administration of Digitalis, relieved by Atropine.—B.M.J. i./24,715.

Flavoring.—Glyl Coriandri, Syl Lavandulæ; Syrupus Aurantii.

℗ **Tinctura Digitalis Foliorum Recentum**—*Martindale.*

Dose.—5 to 15 minims **(0·3 to 1 Cc.).**

Prepared from fresh second year's leaves and chemico-physiologically standardised to normal (=M.L.D., 0·75 Cc. per 100 Gm. frog). Kobert and other authorities favour a preparation made by this method. In view of the poor keeping qualities of the leaf, unless properly stored, and the exceedingly complex composition of its active principles, the idea should be welcome.—*cf.* P.J.ii./13,437,573.

℗ **Glycetract Digitalis.**—*Martindale.*

Dose.—1 to 2 minims. A potent preparation *vide* Glycetracta.

℗ **Pilula Digitalis Composita (Baillie's Pill).—St. G.H.**

Syn. **Guy's Pill, Addison's Pill.**

Dose.—1, as often as 3 times a day.

Mercurial Pill 2, Digitalis Leaves ½, Squill 1. In grains for one pill; in grammes for fifteen.

In cardiac dropsy has a deserved reputation.—B.M.J. ii /09,537.

℞ **Pilula Hydrargyri et Digitalis Composita. St. Bart.'s H.**

Mercurial Pill 1 grain, Digitalis 1 grain, Squill 1 grain, Extract of Hyoscyamus 2 grains.

℣ ℞ **Pilula Von Niemeyer.**—*Dose.*—1 pill thrice daily.

Digitalis Powder ½ grain, Ipecacuanha ¼ grain, Opium Powder ¼ grain, Extract of Helenium ½ grain.

Used in combating the fever of phthisis. When the fever is of the periodical type, with pronounced exacerbations and chills, one grain of Quinine Sulphate is added to the above formula.—*Ex* Pres.

℗ **Vin de Digitale Composé.** *Syn.* Vin de l'Hotel-Dieu, Vin de Trousseau.

Digitalis leaves 1, Squill 1½, Juniper Berries 15, Potassium Acetate 10, Alcohol 90% 20, White Wine 180—all by weight.

Digitalis Glucosides.

The Digitalis (and Strophanthus) Glucosides and their preparations are for the purposes of 1908 *Act not strictly 'preparations' of Digitalis (and Strophanthus), but they should be treated as* ℗.

Digitalis leaves and seeds contain several active crystalline and amorphous principles.

Digitalin (Verum Kiliani) occurs in seeds only. Digitoxin only in leaves. Digitalein occurs in both leaves and seeds.—F. Kraft. P.J i./12,533.

Digitaline Pure Amorphe (Homolle). Fr. Cx. 1884. Ph. Belg

Syn. Chloroformic Digitalin, Digitalinum Gallicum.

Dose.—$\frac{1}{60}$ to $\frac{1}{30}$ grain **(0·001 to 0·002 Gm.).**

Yellowish bitter powder. Practically insoluble in water, but soluble in alcohol and chloroform, and consists principally of a glucoside resembling Digitoxin in its action.

Granules de Digitaline (Homolle) contain 1 milligramme ($\frac{1}{65}$ grain).

Dose.—1 or 2.

Digitaline Cristallisée. *Syn.* Digitoxin (Fr. Cx.).

Dose.—$\frac{1}{250}$ to $\frac{1}{100}$ grain **(0·00025 to 0·0006 Gm.),** in pill. Fr. Cx. has *max. single dose* $\frac{1}{200}$ grain; max. during 24 hours $\frac{1}{64}$ grain

Light, white crystals, very bitter; insoluble in water, nearly in-

soluble in ether and benzine ; very soluble in chloroform. In absolute alcohol at 15° it dissolves 1 in 80, and 1 in 43 of Alcohol 90%.

It consists almost entirely of digitoxin, is cumulative in action and very potent ; should be prescribed as Digitaline, crystallized (Fr. Cx.).

The requirements of the French Codex in regard to this Glucoside cannot be complied with. **Crystallised Digitoxin,** *q.v.*, is frequently used to replace.

Granules de Digitaline Cristallisée Fr. Cx. contain $\frac{1}{10}$ mgr.

Soluté de Digitaline Cristallisée au Millième. Fr. Cx.

Crystallised Digitaline 1, Alcohol 95% 460, Glycerin 400, Water to 1,000 by weight.

Dose.—Max. single dose 5 minims; max. during 24 hours 17 minims approximately.

✱**Nativelle's Crystalline Digitalin,** a special preparation, has been found satisfactory.—B.M.J. ii./05,682 ; M.P. July 14,/09, p. 28. It is probably identical with Digitoxin.—Am. Jl. Ph., May, 1913.

✱**Digitalin Granules, Nativelle** $\frac{1}{240}$ grain, also $\frac{1}{600}$ grain.

(✱Nativelle is T.M. 300453).

Large doses are given to diminish the period of systole and to effect diuresis. Small doses for sedative effect, *e.g.*, in palpitation and to relieve dyspnœa associated with mitral stenosis—one Granule every three or four days. As a general rule suspend administration periodically to prevent cumulative effect.

Note on a case of heart block produced by Digitalin Granules.—L. i./11,19.

✱**Nativelle's Digitalin Solution.** For intramuscular injection into the pectoral or other region free from œdema.

Dose.—1 Cc. containing $\frac{1}{240}$ grain **(0·00025 Gm.)**. An oily stable solution. Ampoules are prepared.

In cases of asystole amenable to Digitalin an injection is made for four consecutive days. In milder cases of hyposystole two days following, 1 Cc. being injected on each occasion. In acute cases with implication of the myocardium and threatening cardiac failure, a single injection usually suffices to restore the strength of the contraction. May be repeated once or twice. When the case is grave an injection of Caffeine Sodio-Salicylate should be given two hours before the Digitalin. In pneumonia, according to circumstances, from one to four doses.

Indications for hypodermic use—

The hypodermic method alone is admissible (1) in grave cases where cardiac failure is imminent and immediate and certain action is required, because in such cases gastro-intestinal absorption is slow and uncertain. (2) In cases in which it is desirable to safeguard the stomach and to avoid setting up gastric intolerance or embarrassment of cardiac action by a dilated stomach, the hypodermic method must be used, *e.g.*, in typhoid with failing heart where diuresis is essential ; in vomiting in arterio-sclerotics where the stomach becomes distended on the slightest irritation.

Angina treated satisfactorily with 5 drop daily doses of 1 in 1,000 solution combined with Theobromine 0·5 Gm. before midday and evening meal for 10 days, then stop the Digitalin.—B.M.J.E. i./07,4.

Digitoxin (P. Helv.). $C_{28}H_{46}O_{10}=542·508$. *Dose.*—$\frac{1}{250}$ to $\frac{1}{64}$ grain **(0·00025 to 0·001 Gm.)**.

Manufacture.—Grind leaves to fine powder, exhaust with water, and after drying again, extract with 50% Alcohol. Precipitate liquor with Liquor Plumbi Subacetatis, collect liquor, drive off most of the alcohol, extract residue several times with Ether, treat with water, and leave to crystallise. Recrystallise from 85% Spirit, using charcoal to decolourise.—Schmidt, p. 1640.

The content in the freshly harvested leaves is stated to be 0·25%.

This is a potent Glucoside stated to have uniform therapeutic activity. ***Soluble*** about 1 in 80 of absolute alcohol, and soluble in chloroform. Sparingly soluble in Alchohol 90%; very soluble in more dilute Alcohol.—E. Berry, P. J. ii./15,783.

In the pure condition it is stated to be insoluble in water. There is, however, physiological and chemical evidence that it is *soluble in the presence of the other glucosides* (*cf.*, Am. Jl. Ph., May, 1913).

Solutions may be made containing $\frac{1}{64}$ grain (**0·001 Gm.**) Digitoxin in 15 minims (**1 Cc.**) of **Petit's Liquor.** This quantity will approximate 40 drops which may be considered a maximum dose. Suitable either *per os* or as an enema. May also be given in **Syrup,** Digitoxin 0·1, Alcohol (90%) 200, Distilled Water 750, Syrup to 2,500. *Dose.*—1 to 4 drachms (**4 to 15 Cc.**).

Tablets and Granules (Pills) of Digitoxin are prepared containing $\frac{1}{250}$ grain ($\frac{1}{4}$ milligramme).

Digitalinum Pulverisatum Purum.

Dose.—$\frac{1}{100}$ to $\frac{1}{2}$ grain (**0·006 to 0·03 Gm.**) three or four times daily in pill, tablets, or subcutaneously. Consists of a mixture of Digitalin (Kiliani), Amorphous Digitonin and Digitalein.—M.Am. Non-cumulative, but caution—powerful drug. It is a yellowish-white powder ***Soluble*** in water and alcohol, nearly insoluble in chloroform. *Well adapted for hypodermic injection.*

When **'Digitalin'** *is ordered either for internal or hypodermic use this substance should be supplied.*

Hypodermic Tablets of Digitalin, $\frac{1}{100}$ grain (**0·0065 Gm.**).

An infant with bronchopneumonia received $\frac{1}{200}$ grain Digitalin in a hypodermic tablet every two hours for several days—this dose was not excessive—these tablets obviously too weak $\frac{1}{100}$ grain tablet should be more useful.—B.M.J. ii./09,919.

Sterules (Hypodermic) Digitalin $\frac{1}{100}$ grain, also with **Strychnine Hydrochloride** $\frac{1}{100}$ grain as heart stimulants.

Tabellæ Digitalini et Nitroglycerini.

Digitalin $\frac{1}{100}$ grain (**0·006 Gm.**) with Nitroglycerin $\frac{1}{1000}$ grain (**0·0006 Gm.**).

Useful in aortic disease. Where vascular tension is high, the addition of Nitroglycerin prevents increase of peripheral resistance, and thus robs the digitalis of the influence on the arterioles, 'on account of which its administration is supposed to be contra-indicated.'

Ⓟ ✱ **Digalen** (T.M. 265442) (Cloetta's).

Dose.—5 to 15 minims.

A proprietary solution said to contain in each 1 Cc. (17 minims) 0·3 mgr. of an amorphous glucoside of same empirical formula as digitoxin. For œdema of cardiac debility.

15 minims correspond to 2 grains of Digitalis Leaves or 18 minims of Tincture.—B.M.J. ii./09,1100.

Ⓟ **Hypodermic Tablets** 1 dissolved in 15 minims makes a solution for intramuscular use of the same strength as above.

The Glucoside is said to have ⅓ the M.W. of the insoluble crystalline Digitoxin. The preparation can be given intravenously without pain and does not hæmolyse blood corpuscles.—B.M.J. i./12,60. See also W. L. Symes, L. ii./11,1349.

It has probably increased diffusibility on account of its increased solubility —to which is due, it is said, absence of digestive disturbance when given *per os*.—Pharmacol, p. 16.

In nephritis with heart complications.—C. Kerr, Pr.Sept.'14.

Ⓟ **Digistrophan Tablets** are made, each = 0·1 Gm. Digitalis with in addition 0·05 Gm. Strophanthus.

ELIXIRS.

These are generally composed of a weak-flavoured syrup, with a fair proportion of alcohol. For list consult Index.

Elixir Aromaticum, Aromatic Elixir, U.S IX.

Dose.—½ to 2 drachms (**2 to 8 Cc.**).

Compound Spirit of Orange, U.S. 12, Alcohol to 250. Add gradually, with constant agitation, Syrup 375, and then Distilled Water 375. Mix with the liquid Purified Talc 30, and filter until clear; then add a mixture of Alcohol 1 and Distilled Water 3 *q.s.* to 1,000. (*Spiritus Aurantii Compositus*, U.S.—Oil of Sweet Orange Peel 40, Oil of Lemon 10, Oil of Coriander 4, Oil of Anise 1, Alcohol to 200).

The following saves time:—Mix the Compound Spirit of Orange with Talcum (Magnesium Carbonate better), add to this in a mortar gradually the water and alcohol previously mixed, transfer to a wetted filter and when all 'through' make up volume to 818 Cc., then add the sugar and shake or percolate the sugar with the filtrate.

Elixir Simplex, B.P.C., 1894:—

Oil of Bitter Orange 30 minims, Rectified Spirit 6 ounces. Dissolve and add Distilled Cinnamon Water 7 ounces, Syrup 7 ounces. Filter through paper moistened with proof spirit, and well sprinkled with kaolin, returning the first portions of filtrate until it passes through bright.

Dose.—20 minims to 1 drachm. This quantity may be added to the ounce of a liquid medicine.

That of B.P.C. 1923 is about ¼ the alcohol strength of above.

N.B.—Alcohol Soluble drugs quite compatible with the original formula may be insoluble in the current one.

Elixir Aurantii Amari. *Syn.* ELIXIR OF CURACAO.

Dose.—2 to 4 drachms (**8 to 15 Cc.**).

Oil of Bitter Orange 4, Tincture of Bitter Orange Peel 20, Alcohol 300, Strong Orange Flower Water 20, Syrup 400, Distilled Water (*s.a.*) to 1,000. Filter through Kieselguhr.

Elixir Rhei, B.P.C.—*Syn*. LIQUOR RHEI DULCIS.

Dose.—1 to 3 drachms.

Dissolve Anethol 0·05 in Alcohol 2·5 and add to Liquid Extract of Rhubarb 25, Syrup 22·5, Glycerin 15 and Water to 100 previously mixed; filter if necessary.

Elixir Rubrum.

Dose.—20 minims to 1 drachm (**1·2 to 4 Cc.**).

Solution of Carmine (*q.v.*) 1, Simple Elixir (B.P.C. 1894) 64. Gives an agreeable flavour and colour to liquid medicine, but is not compatible with acids.

Elixir Ficorum (*Martindale*).—*Syn.* SYRUPUS FICORUM.

Elixir or Syrup of Figs.

Dose.—1 to 4 drachms at bedtime or early morning.

Macerate Senna 16 ounces in cold water *q.s.* to cover, twice and decant. In the first liquor heated to boiling, macerate figs cut small 32 ounces. Strain off the liquor as much as possible, and macerate

the marc in the second senna liquor previously heated to boiling point. Strain off this second maceration liquor, and evaporate the two combined to 35 ounces. Dissolve in this (hot) sugar 70 ounces. Add, mixed, cinnamon oil 10 minims, oil of cloves 10 minims, chloroform 25 minims in alcohol 90% 150 minims. Make the product up to 80 ounces with water.

ENEMATA.

Substances administered *per rectum* are absorbed approximately at the same rate as when administered *per os*—exceptions are Strychnine and Quinine (slower).

B. Yeo gives the following details concerning :—

Rectal Feeding.

It is said that under the most favourable conditions it is only possible to supply by means of enemata about one-quarter of the food material required to maintain nutritive equilibrium. **Protein**, even when peptonised, is so badly absorbed as to be of comparatively little value—indeed it is viewed as undesirable (see also **Nutrient Enemata** *infra*). The same is generally true of **Fat**, even when emulsified, but different individuals vary widely in their power of fat-absorption. **Sugar** is well absorbed, but allowance must be made for the destructive activity of bacteria breaking up sugar, so that some at least is lost for purposes of nutrition. The same is probably true in a less degree of proteids. **Water and Salts** are well absorbed. Pasteur claims that five or six ounces, gradually increasing by one ounce at a time to ten ounces, of warm water given every four hours will sustain a patient with supplementary nourishment for ten days to three weeks. Alcohol is well absorbed. By the most careful adjustment it is difficult to raise fat absorption above 10 Gm. in twenty-four hours or that of proteid above 20 Gm. During a course of rectal feeding the bowels should be washed out once daily with an enema of tepid water before the nutrient injections are given. This cleans the bowel and washes away poisonous products of albuminous decomposition.

The injection of Nutrient Enemata should be given as slowly as possible. The best posture is with the patient on his left side, with his hips raised on a pillow. To avoid thirst not less than 2 pints of fluid should be allowed in the twenty-four hours to an average adult patient.

According to Marshall, Starch 50 Gm. *pro die* can be digested. Diluted Alcohol is readily absorbed and increases the absorption of other medicines.

Stimulant Enema. 1 to 2 ounces of Brandy with warm water 1 to 3 ounces.

Nutrient Enemata.

Rectal feeding by Protein is thought undesirable. Toxic substances may be produced. 88% of the Nitrogen in Peptonised Milk was not absorbed. Of **Dextrose** (in 10% solution) however, 99% was absorbed. 6% is isotonic with blood and would be found more convenient and less irritating. 15 ounces or more of this Solution four times a day is well retained by an adult if the rectum is well washed out once a day with Saline Solution. The 100 Gm. or more of Dextrose thus given daily causes a diminution of Nitrogenous waste.—N. Mutch and J. H. Ryffel, B.M.J. i./13,111.

Enema Nutriens. L. H. *Syn.* Dextrose Nutrient Enema.

Dose.—5 ounces every 4 hours, or if patient can retain it 10 ounces every 8 hours.

To 1½ pints of milk boiled and cooled add ½ ounce of a reliable Pancreatic Fluid or 4 Pancreatic Tablets. Maintain at body temperature 24 hours, add

1½ ounces of Pure Dextrose. Dextrose has been proved to be absorbed by the rectum hence an important means of feeding patients who cannot take food by the mouth. The Amino-Acids separated by pancreatising the milk are also absorbed.—A. Rendle Short and H. W. Bywaters, B.M.J. i./13,1361.

Enemata to act locally on the rectum or large intestine are generally half to two pints in volume.

Glycerin Enemata for laxative effect rarely exceed ½ ounce. It is customary with Medicated Enemata *e.g.*, Enema Opii to prescribe 'Opium Tincture' *q.s.* (*e.g.*, 5 to 20 minims) as desired by the physician, Mucilage of Starch to 1 (or 2) ounces, and direct this to be used at 100° F., mixed with gruel 5 ounces by the nurse.

Aperient Enemata (1 to 6 pints) are made with Soft Soap, with warm water *q.s.*, *e.g.*, **Enema Simplex, L.H.** 1 ounce to the pint, or with gruel. Marshall gives the following:—

Evacuant Enemata.

Enema of Sodium Chloride 2 to 5%; Enema of Molasses 10 to 30%; Enemata of Chamomile Infusion and other vegetable infusions; Enemata of Fixed Oils (½ to 1 pint of Olive Oil), for inflammation of rectum associated with hardened fæcal masses. *Vide* also **Aperient** above mentioned

Enemata for action on rectal mucous membrane contain—

Alum 0·5%.
Asafetida 5%.
Boric Acid (Saturated Solution)
Bismuth Carbonate or Subnitrate 1%.
Cresol (preparations) 0·5 to 1%.
Ferric Chloride (Strong Liquor) 2%.
Infusion of Garlic and similar antispasmodic substances.
Lead Acetate 1%.
℗ Mercuric Chloride 0·01 to 0·05%.
Mucilage 25%.
Oil of Turpentine 0·5 to 1%.
℞ ℙ1 Opium (or its alkaloids), a maximum dose (℗ if containing less than 0·2% morphine). L.H has Tincture 10 to 60 minims, with Starch Enema to 4 ounces.
Salicylic Acid 0·3%
Silver Nitrate 0·1%
Tannin 1%.

Cf. also in text Enema Magnesii Sulphatis (et Acida), Enema Naphthalini, Enema Olei Ricini and Enema Olei Terebinthinæ.

For ulceration of rectum Silver Nitrate 10 grains to the pint, also Salol Enemata 1 to 2 drachms in Turpentine (U.S.), also Ferrous Sulphate and Copper Sulphate have been used.

Enema for thirst after operation (U.C.H): 2 pints of hot water.

U.C.H., C.X., R.F.H., R.N.H., E., C.H.W., St. G.H., and **W.,** and others give formulæ for various Enemata which should be consulted.

ERGOTA.

ℙ1 '*Ergot of rye and preparations of Ergots.*'

ℙ1 **Ergot of Rye** (*Off.* and B.P. '98).—*Syn.* SECALE CORNUTUM. The sclerotium of the fungus *Claviceps purpurea* (*Pyrenomycetes*) on *Secale cereale* (*Graminaceæ*).

Dose.—15 to 60 grains (**1 to 4 Gm.**) in recent powder infused in boiling water. FR. CX.—*Maximum single dose* 15 grains. *Maximum during 24 hours*, 60 grains approximately.

History and Chemistry.—Prof. J. Barger, P.J. ii./20,470.
Heat and moisture, effect of, on Ergot.—G. Tate, P.J. i./21,485.
Cultivation of Ergot.—P.J. ii./21,87.

Preservation.—

To be not more than 1 year old (U.S. VIII., this is now omitted in U.S. IX.) and to be kept whole, not in the powdered condition.—

(*Off.*) and F.I. *It should be kept in well closed vessels,* adding a Chloroform or Carbon Tetrachloride to prevent attack by insects. Cushny showed that old ergot is practically useless.

Antidotes.—See chapter on.

Flavoring.—The Liquid Extract, etc., are not nauseous to taste, but Syl Vanillæ, or Syrupus Limonis or Syrupus Aurantii may be used.

Uses.—Almost entirely for its action on the uterus, stimulating muscular contraction, and so to check bleeding after parturition, and from the presence of fibroid tumour, also to promote involution.

Ergotin causes spasm of arterioles and rise of blood pressure, by acting directly on the vessels independently of the central nervous system. It is useful in polyuria.

Is also given to check night sweats, spermatorrhœa and menorrhagia. It has been suggested for the relief of sleeplessness, by causing cereb al anæmia by constricting the blood vessels.

All diseases in which a drug inducing muscular contraction is indicated should, according to some authorities, be treated by Ergot, *e.g.* disturbances of the circulatory system, skin affections, acne rosacea, also nervous complaints (excessive smoking).

In surgical shock 15 minims of Injection are useful.

For disordered circulation and for headache (hypodermically), alcoholism, hysteria and in acute inflammatory infections—meningitis, pneumonia, pericarditis, Ergot has also been used.

Ergot for *internal hæmorrhage* only makes matters worse by raising general blood pressure, and bleeding which has stopped may be started again by thus raising the blood pressure.—P J. i./11,179.

In chorea there is no drug more useful.

℗1 **Extractum Ergotæ Liquidum.** 1=1 of Ergot. (*Off.* and B.P. '98), '100%.'—F.I.

Dose of Off. preparation.—10 to 30 minims (**0·6 to 2 Cc.**) or more It is best recently prepared (not more than 6 months old).

Fr. Cx., 1=1 by wt. Maximum *dose* during 24 hours 6 Gm. Prepared by macerating with water containing 0·05% Tartaric Acid and further treatment.

F. H. Carr and H. H. Dale advise the U.S.P. process in preference. —P.J. ii./13,130, *vide* also Extractum Ergotæ.

The difficulty with this preparation is that it is liable to decompose whilst making in bulk. Instead of infusion and subsequent evaporation it has been suggested to repercolate without evaporation.

Franklin suggested a semi-alcoholic preparation in place of an aqueous extraction, *i.e.*, to be made by percolating with 35% Alcohol—the resulting liquid extract is physiologically much more active—the product is of a deeper colour and better aroma. The proportion of Alcohol is stated to be enough to keep it.—P.J. ii./10,120,152.

℗1 ✱ **Ergoval** (T.M. 326360) —A preparation made on these lines from Spanish Ergot. Physiologically standardised.

Dose.—10 to 30 minims, or 1 drachm in urgent cases.

℗1 **Extractum Fungi Secalis Fluidum P. Austr.** Extract fat from Ergot 100 by petroleum ether; dry the marc and moisten with a mixture of Glycerin 5, Alcohol 20, Water 20. Percolate to 100.

Normal Liquid Extract (Physiologically Standardised) may be of such strength that 0·66 Cc. will cause a rise in blood pressure of 60 m.m. in an animal weighing 1,500 Gm. A definite amount is given to a cat and

tracings are taken of the blood pressure and uterine contractions, *i.e.*, the effect desired when ergot is given to the patient.

Martin found the Liquid Extract of the British Pharmacopœia a good active preparation if made from sound ergot.—P.J. ii./09,149.

Physiological Tests on identical samples of Liquid Extract of Ergot by three different physiological experts, gave three totally different reports. Difference of opinion exists as to whether Russian or Spanish Ergot is best.—P.J. ii./09, 794.

℞ **"Ergot Aseptic."** Concentrated and sterilised liquid extract in 1 Cc. bulbs, representing Ergot 2 Gm.

℞ **Tinctura Ergotæ** (B.P. 1885). TINCTURA HÆMOSTYPTICA. 1 in 4 Proof Spirit.

Dose.—5 to 30 minims **(1·3 to 2 Cc.)** or more.

Ph. Ned. has 1 in 5 Alcohol 70%. Ergot freed from fat with Petroleum Ether.

℞ **Injectio Ergotæ Hypodermica.** (*Off.*).

Dose.—5 to 10 minims **(0·3 to 0·6 Cc.).**

Ergot Extract 33% in Distilled Water with 1% Phenol. Should be freshly prepared. B.P. '98 same strength in Ergot.

Use.—In epistaxis, injection into the arm of 3 grains of Extract in 10 minims of warm water is successful. A dose of Ergotin, injected deeply into the gluteal muscles just before delivery, seldom fails to give perfect uterine contraction. Neither ergot nor iron will induce abortion in pregnant women unless previously disposed (Lombe Atthill).—B.M.J. i./89,350.

℞ **Sterules, Hypodermic** contain 10 minims of this injection.

℞ **Extractum Ergotæ** (*Off.*). *Syn.*—ERGOTIN (B.P. '98), EXTRACTUM HÆMOSTATICUM (F.E.).

Dose.—2 to 8 grains **(0·12 to 0·5 Gm.).**

Off. and FR. CX.—an aqueous extractive precipitated by alcohol and evaporated. U.S is similar in strength and mode of making to B.P. '98, but contains 10% of glycerin.

F. H. Carr and H. H. Dale advised extraction with 60 per cent. alcohol, and nitric acid added instead of hydrochloric in the B.P. '98 method; evaporated to a soft extract without filtration, it would contain practically all the active ingredients of ergot.—P.J. ii./13,130.

In chronic cases of hæmaturia occasionally useful.—Tirard, Med. Treatment. It is given to check all forms of passive hæmorrhage.

℞ **Tablets and Pills,** 1, 2, and 3 grains. *Dose.*—1 to 3.

For making a hard extract for pills evaporate to dryness and add milk sugar, or powdered althea.

℞ **Capsules of Ergotin** contain 3 and 5 grains **(0·2 and 0·3 Gm.).** (*cf.* also Capsules Apiol and Ergotin.)

℞ **Tablets of Ergotin, Senecin Compound** contain Ergotin $\frac{1}{2}$ grain, Senecin $\frac{1}{2}$ grain, Hydrastin $\frac{1}{2}$ grain, Hamamelin 1 grain, Chloretone 1 grain. Useful in dysmenorrhœa and menorrhagia.

℞ **Ergotinina,** *Ergotinine Cristallisée* $C_{35}H_{41}N_5O_6 = 627{\cdot}543$, FR. CX SUPP. Barger and Carr give the formula $C_{35}H_{39}O_5N_5 = 609{\cdot}527$.—B.M.J. ii./06, 1791, and state it is practically inactive.

Dose.—$\frac{1}{200}$ to $\frac{1}{64}$ grain **(0·0003 to 0·001 Gm.).**

FR. CX. has the latter as *maximum single dose*, and maximum in 24 hours $\frac{1}{32}$ grain, approx.

An alkaloid in minute yellowish crystals, insoluble in water, ***Soluble*** in Alcohol (1 in 200 of 95%, Fr. Cx.), less in ether, very in chloroform, present to the extent of 0·1 to 0·25% in Ergot.

Acetic, Lactic and Formic Acids dissolve the base, especially if in concentrated strength.

℗ **Ergotininæ Citras.** $C_{35}H_{40}N_4O_6.C_3H_4.OH\ (COOH)_3 = 804{\cdot}621$.

Dose.—$\frac{1}{150}$ to $\frac{1}{30}$ grain **(0·0004 to 0·002 Gm.).**

A soluble salt of the base, in greyish powder.

℗ **Hypodermic Tablets** are prepared containing $\frac{1}{200}$ and $\frac{1}{100}$ grain of Ergotinine Citrate.

℗ **Ergotoxine** (Sphacelinic Acid and Sphacelotoxin—Kobert, Jacobj, may contain this)—$C_{35}H_{41}O_6N_5 = 627{\cdot}553$. *Dose.*—$\frac{1}{100}$ to $\frac{1}{30}$ grain. Is described as amorphous and hardly soluble in water, and strongly active physiologically on the uterus—raises blood pressure, and is the principle in Ergot that produces gangrene in the cock's comb on injection. Solutions in dilute Caustic Alkali are injected. The effect of the alkaloid is enhanced by the coexistence of certain Amines, *vide infra.*—P.J. i./07,520, *cf.* also M.A. 1908,15 ; Y.B.P., 1907,60, J.C.S., 1907,91,337,349.

Ergotinine is stated to be the Anhydride of Ergotoxine *v. supra*—one can be converted into the other.

℗ **Cornutine** is apparently impure Ergotoxine.

℗ **Hypodermic Tablets** contain Ergotoxine 1/100 grain, also Ⓔ ℗ with Morphine Sulphate 1/6 grain, and ℗ with Strychnine Sulphate 1/20 grain. the latter being used in collapse or shock.

℗ **Injectio Ergotoxinæ Hypodermica** 0·12% ($\frac{1}{100}$ grain in 8 minims). *Dose.*—2 to 15 minims **(0·1 to 1 Cc.).**

℗ ✱**Ernutin** (T.M.277883).—Tubes of Solution physiologically standardised for hypodermic use, contain Ergotoxine, Tyramine and Ergamine (*v. infra*) In two forms (*a*) for oral.—*Dose*—30 to 60 minims to be given *per os* after labour is completed, every three hours until contraction effected, and (*b*) for hypodermic use. *Dose.*—5 to 10 minims after expulsion of the placenta.

In addition to the Alkaloid Ergotoxine, Ergot contains **Amines.**

Of the amines in Ergot two are concerned in its activity :—

(*a*) *p*-hydroxyphenylethylamine (Tyramine *vide infra*) produced by splitting off CO_2 from tyrosine. This has an action similar to, though weaker than, adrenine, produces contraction of the cat's uterus in the pregnant and inhibition in the non-pregnant condition

(*b*) β-Iminazolylethylamine (*i.e.* **Histamine** $C_5H_9N_3$) produced from Histidine by splitting off CO_2. This has intense action on plain muscle. The plain muscle fibre of the uterus in particular is stimulated to contraction by minute doses. It causes fall of blood pressure. To this the name ✱**Ergamine** (T.M. 324681) has been applied.

Ernutin administered after normal confinements is stated to prevent or arrest hæmorrhage and promptly produce a firm contraction of the uterus.

Hypodermic Tablets of Ergamine contain 1/65th grain (0·001 Gm.).

Evidence for the toxic origin of spasmodic asthma is brought forward by A. Eustis (Amer. Journ. Med. Sci., Phila., 1912, CXLIII., 862), who has not yet seen a case of asthma not due to intestinal toxæmia. In searching for the specific toxin, he investigated the Amines produced by the intestinal putrefaction of several amino-acids, formed in the normal pancreatic digestion of protein. He found that this body,β-iminoazolylethylamine, on injection into guinea-pigs and rabbits produced changes in the lungs similar to those found in asthma. He has found this base in the fæces of 3 *out of* 15 *patients.* He suggests that the asthmatic has lost the power, possessed by normal persons, of detoxicating this Amine formed by intestinal putrefaction.—Pr., 1912, p. 654.

B. Aminophilus Intestinalis isolated from human stools by means of a culture medium containing Histidine. It produces β-iminoazolylethylamine. This body was isolated by Barger and Dale from the intestinal extract.—D. M. Bertrand & A. Berthelot, L.i./13,523.

Histamine, being formed by decarboxylisation of Histidine, which is derived from proteins, it is conceivable that such substances are produced in trauma. This is an explanation of shock differing from that of the acid causation theory (Almroth Wright's).—L. Hill, B.M.J. i./21,771.

Subcutaneously. Histamine excites a flow of gastric juice in man.—A. R. Matheson, and S.E. Ammon.—L. i./23,482.

℞ ***p.*-Hydroxyphenylethylamine.** (Patented) *Syn.* ✱ TYRAMINE (T.M. 309250); UTERAMIN, SYSTOGEN, $OH.C_6H_4.CH_2CH_2NH_2$= 137·136.

Dose.– 1/12 grain (**0·005 Gm.**), repeated if necessary.

An organic base which is stated to be the chief active principle of aqueous extracts of Ergot.

It contributes along with Ergotoxine to the action of Ergot, and is a constituent with the latter in **Ernutin.**

Uses. Its action is similar to that of the suprarenal active principle, but weaker, slower, more persistent and less toxic. Given hypodermically or by the mouth it produces a marked rise of blood pressure, with increased vigour of the heart's action. Administered in shock or collapse and for producing contraction of the uterus *post partum.*

Guggenheim found doses of 0·02 Gm. para-oxyphenyl-ethylamine failed to have any influence on parturient women.—P.J. i./13,905.

The activity of placental extracts has been shown to be due to Tyramine. It appears to be present in Ergot to the extent of 0·01 to 0·1%. It is probably a normal product of the living fungus, like Cadaverine, which was also isolated from Ergot. *p.*-Hydroxyphenylethylamine was obtained from putrid meat. It may be made by heating tyrosine, and is readily synthesised by reducing *p.*-hydroxybenzylcyanide (*Syn.* Hydroxyphenylacetonitrile) with sodium and alcohol: $OH\ C_6H_4.CH_2.CN + 4H = OH.C_6H_4.CH_2CH_2NH_2$.—Barger, Trans. Chem. Soc. 1909, vol 95, p. 1123; Engl. Pat. (1909) 314. Crystallised from xylol and distilled (B.P. 161°–163° at 2 mm.) the base forms hexagonal plates, M.pt. 161°, readily soluble in Water and in Alcohol. On methylation it yields the methiodide of the alkaloid hordenine. $OH.C_6H_4CH_2CH_2N(CH_3)_3I$.—See also Biochem. Jl. 1907,2,286; C.D. i./09,833; ii./09,229; P.J. i./09,739,761; ii./09,141; L. ii./09,1442.

p-Hydroxyphenylethylamine is also capable of preparation in other ways: (1) by nitrating benzoylphenylethylamine, reducing the resulting *p*-nitro compound to the amine, which yields the benzoyl derivative of the product required, when diazotised in boiling solution. This benzoyl derivative is then hydrolised.—Eng. Pat. (1909) 1561. (2) Another method starts from anisic aldehyde.—Perkin and Robinson, J.C.S. 91 (1907) 1079. (3) A further method see Rosenmund, Ber. 42 (1909) 4779.—per May, pp. 137, 138.

℞ **Hypodermic Tablets of Tyramine** contain ½ grain (0·02 Gm.)

Other Ergots than that of Rye are equally or more active. Ergot of Fescue grass from New Zealand shows chemically 0·34% alkaloid—Wheat Ergot from Sweden contained 0·12%.—F. H. Carr and H. H. Dale, P.J. ii./13,130. See also H. A. D. Jowett, P.J. i./13,364.

Ergotamin of Stoll in Basle identical with Ergotoxin. If Ergot be retained in the B.P. on account of its specific alkaloids, the method of making the *Off.* extracts ought to be revised to ensure the alkaloids are present in same and not thrown away. If activity due to Tyramine and other putrefactive alkaloids then Ergot ought to be removed.—H. H. Dale, B.M.J. ii./22,1172; L. ii./22,1275.

In the 1914 B.P. the Liquid Extract was changed from an alcoholic to a watery extract. Sir Nestor Tirard mentioned that the B.P. is controlled by International agreement whereby it is compelled to make all liquid extracts watery extracts, alcohol being added subsequently. In U.S.A. alone, in spite of this agreement, the alcoholic extract had been retained. (Acidulated Alcohol retains the Ergotoxine).—L. ii./22,1276,1277,1284.

Urine normally contains *p*-hydroxyphenyl-ethylamine or a body allied to it and **Urohypertensine** (the latter probably identical with iso-amylene) both causing rise in blood pressure.—L. ii./09,367.

℞ **Liquor Ergotæ Aceticus.** *Syn.* **Fluidextractum Ergotæ U.S.** VIII. Contains 2% of acetic acid, with diluted alcohol. 1=1 of Ergot.

Dose.—10 to 60 minims (**0·6 to 4 Cc.**).

U.S. *Average dose.*—30 minims.

℞ **Liquor Ergotæ Ammoniatus.**—1=1 of Ergot.

Dose.—10 to 60 minims (**0·6 to 4 Cc.**).

An efficient and reliable preparation, made with diluted ammoniated alcohol. The combination of ammonia and Ergot is indicated in some forms of post-partum hæmorrhage, &c. In dose of ½ to 1 drachm is useful in second stage of labour when the pains are feeble but the passages are normal.

℞ **Elixir Ergotæ cum Ferro.**—*Martindale.*

Dose.—2 drachms repeated if necessary.

Dissolve Iron pyrophosphate (U.S. VIII., *no other*) 5 grains in 1 drachm of warm water and add to Liquid Extract of Ergot 10 minims, mixed with Simple Elixir (B.P.C. 1894) 50 minims.

For anæmia and excessive (or diminished) menstruation in young women.

℞ **Tinctura Ergotæ Ammoniata.** *Off.*

Dose.—30 to 60 minims (**2 to 4 Cc.**).

Strength 1 of Ergot in 4 of finished Tincture.

The ammoniated Tincture of Ergot found to be the most potent—far more so than the liquid or other Extract.—H. Spencer, B.M.J. ii./22,1174.

℞ **Mistura Ergotæ Sedativa S.H.**

Ammoniated Tincture of Ergot 30 minims, Potassium Bromide 8 grains, Potassium Chlorate 8 grains, Glycerin 15 minims, Chloroform Water to 1 ounce.

℞ **Mistura Ergotæ Composita, E.G.A.**

Dose.—½ ounce (**15 Cc.**).

Liquid Extract of Ergot 20 minims, Ferric Chloride Solution 10 minims, Quinine Hydrochloride 2 grains, Glycerin 1 drachm, water to ½ ounce.

℞ **Acidum Scleroticum.**—*Syn.* Sclerotinic Acid. $C_{12}H_{19}NO_9(?)$ =321·22.

Dose.—½ to ¾ of a grain (**0·03 to 0·05 Gm.**) hypodermically in 10 minims of water.

An amorphous brown hygroscopic acid principle obtained from Ergot. Hæmostatic and anti-epileptic.

℞ **Hypodermic Tablets** contain $\frac{1}{16}$ grain (**0·004 Gm.**) **Sclerotic Acid.**

ERYTHROL NITRAS.

$CH_2.ONO_2-(CH.ONO_2)_2-CH_2.ONO_2$=302.10.

Syn. Erythrol Tetranitrate; Nitro-Erythrite. Erythro-tetranitral.

Dose.—½ to 1 grain (**0·03 to 0·06 Gm.**), increased to 3 grains or more in tablet form *vide infra.*

In colourless and slightly tar-like smelling crystals, ***soluble*** in water about 1 in 20,000, about 1 in 60 of absolute alcohol; melting point, 61° C. It is formed by dissolving erythrol (a sugar obtained from various lichens, e.g., *Rocella tinctoria, R. fuciformis,* etc.), in fuming nitric acid, and precipitating by sulphuric acid; is explosive, except when in solution in chocolate.

Uses.—As a vaso-dilator like nitroglycerin and amyl nitrite. Its slight solubility as against Nitroglycerin (1 in 800) renders action slower and more prolonged in reducing blood-pressure. Employed in angina pectoris, chronic Bright's disease, nephritis, aneurism, Raynaud's disease, dyspnœa, headache, and nervous affections.

For angina, to avert paroxysms even half a drachm a day has been taken.

Tabellæ Erythrol Nitratis.—*Martindale. Dose.*—1 or 2.

Contain $\frac{1}{2}$ grain, combined with chocolate. **Tabellæ** $\frac{1}{8}$, $\frac{1}{4}$ and 1 grain are also prepared.

Præcordial pains are promptly relieved by a tablet three times a day.

Daily use of the tablets, beginning with $\frac{1}{2}$ grain thrice daily and gradually increasing, will ward off attacks.

Intermittent closing of cerebral arteries. Various questions to consider as to treatment: Spirit of Nitrous Ether controls the irritable tonicity of the vessel walls; where symptoms are urgent Erythrol Nitrate $\frac{1}{4}$ to $\frac{1}{2}$ grain repeated every 3, 4, or 6 hours, as required, is advised.—W. Russell, B.M.J. ii./09,1110.

Melancholia, in which affection the blood pressure is often found abnormally high, is frequently relieved by lowering it. Start with $\frac{1}{2}$ grain tablets twice daily and slowly increase the dose to two or three grains daily.—Robertson, B.M.J. i./11,800.

In arteriosclerosis Erythrol Tetranitrate useful.—M.A. 1911.

In aortic disease for relief of serious pain Amyl Nitrite and Nitroglycerin are employed (*q.v.*). Erythrol Tetranitrate produces little effect until half an hour after its administration, and the maximum effect is produced at the end of an hour; the arterial tension gradually increases again, but it does not return to its previous condition until about ten hours after the dose has been taken.—Tirard.

Asthma, very effective during the paroxysm, especially if followed by some hot drink, *e.g.*, Bovril; relief lasts at least 24 hours.–W. W. W.

In lead colic Erythrol is an excellent sedative, as it relaxes the painful spasms of the intestinal coats.

Mannitol Nitrate, Mannitol Hexanitrate.—$CH_2.ONO_2.(CH.ONO_2)_4 CH_2.ONO_2 = 452{\cdot}142$. *Syn.* HEXANITRIN. NITROMANNITE.

Dose.—1 grain (**0·06 Gm.**), increased.

The nitrate of the hexahydric alcohol mannite, $C_6H_8.(OH)_6 = 182{\cdot}142$. **Ph. Ned.**

In light acicular crystals, M.pt. 113° C.; is less soluble in water but more explosive than erythrol nitrate, and if long kept is liable to decomposition. Requires extra care. Is used similarly to erythrol nitrate, and is not so costly. In angina and asthma its action is not so powerful, but probably more prolonged.

Tabellæ Mannitol Nitratis.—*Martindale.*

Contain 1 grain (**0·06 Gm.**) in chocolate basis.

Prof. Silvan (Clinique de Bologne, Italy) reported that in cases in which a 'hypotensive' condition represents the predominant symptom, or at least the most apparent cause of many of the morbid points complained of by patients, this substance, with which one can successfully diminish and maintain for a considerable time a reduced pressure, has given satisfactory and comfortin results.

ERYTHROPHLŒUM.

Casca Bark.—*Syn.* Sassy Bark; Ordeal Bark. The bark of *Erythrophlæum Guineense* (*Leguminosæ*).

Tinctura Erythrophlœi.

1 in 10 Alcohol (90%). *Dose.*—5 to 10 minims (**0·3 to 0·6 Cc.**).

℗ **Erythrophlœinæ Sulphas.** *Dose.*—$\frac{1}{40}$ to $\frac{1}{24}$ grain (**0·0015 to 0·0025 Gm.**) in pill.

In yellowish white granular crystals, soluble in about its own weight of water. Has the combined action of digitalin and picrotoxin, and is a local anæsthetic for eye-work in 0·05 to 0·25% solution.

The proportion of Erythrophleine in the drug is exceedingly small. An examination of the commercial salt indicated the approx. formula to be $C_{28}H_{43}O_7N.HCl$.—Am. Jl. Ph., Aug. 1912.

Examination of the bark and isolation of alkaloid. Reference to Laborde's work on *E. Couminga*, in which 0·4% was stated to be found. By the Keller process about 0·10% of pure alkaloid was extracted from *E. Guineense* in the form of a very pale yellow varnish from which unsuccessful attempts were made to prepare a crystalline salt.—C. W. Maplethorpe, P.J. ii./23,85.

Antidote.—A prompt emetic or use of stomach pump, with subsequent stimulants.

Dental Use.—An almost ideal drug for the treatment of sensibility of dentine. It is a true obtundent only where locally applied, and has no central direct effect on the pulp. The sensibility in a cavity filled with the alkaloid was in 24 hours absolutely abolished

℗ '**Throphleol,**' a solution (50%) of **Erythrophleine Sulphate** in **Eugenol** is most conveniently used.

After thorough dehydration of the cavity a small piece of cotton or bibulous paper saturated with the solution is sealed with a temporary gutta percha filling, placing as much as possible in actual contact with the dentine, and left *in situ* for 24 or 48 hours, not longer, or slight inflammatory symptoms in pulp or peri-cementum supervene. With this exception it has no injurious effects even for young children. Death of the pulp has not been observed after use. Pain and peri-cementitis 2 or 3 days after filling have, however, been reported.—Dental Annual and Directory, 1904, *p.* 223.

Excavation of the approximal cavity in a first molar was painless, but that of the occlusal cavity in the same case was painful.—Dental Surgeon, April 15, 1905.

EUONYMI CORTEX

The Root Bark (*Off.*) obtained from *Euonymus atropurpureus* (*Celastraceæ*), the wahoo or spindle-tree.

Euonymus Atropurpureus should be carefully distinguished from spurious barks. It should show externally longitudinally striated cork and a tangentially striatified liber and delicate threads when gently broken transversely also medullary rays consisting of a single row of cells.—E. M. Holmes, P.J. i./18,88.

Uses.—Possesses tonic, hydragogue cathartic, diuretic, and anti-periodic properties.

Extract of Euonymus (*Off.* and 1898). *Syn.* Eunoymin.

Dose.—1 to 2 grains (**0·06 to 0·12 Gm.**). **Tablets,** $\frac{1}{6}$, $\frac{1}{2}$ grain. $\frac{1}{4}$ to 1 grain cholagogue, 1 to 4 grains cathartic.

A brown alcoholic extractive containing calcium phosphate to retain it in the powdered condition. In commerce chlorophyll is sometimes added. Fr. Cx. has Evonymine Brune, *max. single dose* $1\frac{1}{2}$ grains.

Pilula Euonymin.

Euonymin 2 grains, Extract of Henbane ½ grain, for one pill; take at bedtime. A cholagogue stimulant, producing no depression or headache; requires to be followed by a saline aperient in the morning.

One grain, combined with 4 grains of Iridin, is a successful purge.

Extractum Euonymi Liquidum.

1=1 made with Alcohol (90%) 4, Water 1. *Dose.*—10 to 60 minims (**0·6 to 4 Cc.**). The **Fluidextract U.S. viii.** is similar.

Tincture. *Dose.*—10 to 40 minims (**0·6 to 2·5 Cc.**). 1 in 5 Alcohol 45%.

Liquor Euonymini et Cascara. B.P.C.

Dose.—½ to 1 drachm.

Liquor Euonymini et Iridini. B.P.C.

Dose.—½ to 1 drachm.

Rub Dry Euonymus Extract 3·66 and Iridin 1·83 with Alcohol 45% 50. Filter and add Potassium Carbonate 1·37 in water 25, and make up with Alcohol 45% to 100. Purgative and presumed cholagogue.

Liquor Euonymini et Pepsini (Glasg. Form.).

Dose.—½ to 1 drachm (**2 to 4 Cc.**).

Euonymin 155 grains, Pepsin Soluble (Scale) 310 grains, Dilute Hydrochloric Acid 340 minims, Alcohol (45%), 6 ounces, Chloroform Water to 20 ounces.

FEL BOVINUM PURIFICATUM.

Purified Ox Bile (*Off.*).

Dose.—5 to 15 grains (**0·3 to 1·0 Gm.**). Slipule No. 1 for 5 grains. A dark greenish brown bitter-sweet mass.

Soluble in water and alcohol 90%, insoluble in ether.

Manufactured by evaporating 20 of fresh ox bile to 5, mixing with 10 of alcohol 90%, separating the precipitate and evaporating the clear fluid to thick extract consistence. It is composed of bile salts, cholesterin, lecithin and bile pigments. It is best given in salol-coated pills or '**Stearettes**' containing 5 grains. **Capsules** contain 5 grains each.

Uses.—An emulsifier of fat and a stimulant to the action of the liver. Has been given in jaundice and typhoid. A small quantity diluted with water may be used as an enema in obstinate constipation. Pig's gall has also been used. The bile of venomous snakes is said to act as antidote to their poison.

Fel Bovinum Exsiccatum.—*Dose.*—5 to 10 grains in cachets.

Dysentery has been treated with satisfactory results by rectal injection of 1½—2 ounces of fresh bile of sheep.

In rheumatoid arthritis where *B. Coli* infection is derived from a chronic colitis, ox gall in 10 to 15 grain doses several times daily is one of the most efficient remedies.—B.M.J. ii./10,305.

Choleokinase.—A proprietary in capsule form containing bile principles and duodenal ferment. For use in colitis, constipation and jaundice.

FERRUM.

Fe=55·84.

Ferrum Redactum. *Syn.* QUEVENNE'S IRON.

Dose.—1 to 5 grains (**0·06 to 0·3 Gm.**).

Fine powdered iron containing at least 80% (U.S. 90%) metallic iron, prepared by reducing ferric hydroxide with hydrogen.

Incompatible with tannin and metallic salts.

As the human body contains only about 39 grains of iron, to give large quantities, *e.g.*, 6 to 10 grains *per diem* is futile.—H.

Pills of Reduced Iron require $\frac{1}{6}$ to $\frac{1}{3}$ grain Compound Tragacanth Powder to bind them. **Trochisci Ferri Redacti** contain 1 grain.

Ferri Carbonas Saccharatus (*Off.*).

Dose.—10 to 30 grains (**0·6 to 2 Gm.**).

Ferrous oxycarbonate, $x FeCO_3\ y Fe(OH)_2$, partially oxidized and mixed with glucose (sugar in '98 B.P.), the mixture containing not less than 50% (B.P. '98 33%) of its weight of ferrous salt if reckoned anhydrous carbonate $FeCO_3$=115·845. P. Ital. IV. requires 9·5 to 10·5% Fe.

Incompatible with tannin-containing drugs, also with acids and acid salts.

Ferri Carbonas Saccharatus Concentratus.

Four times as strong as the U.S. preparation, *i.e.*, containing about 60% of Ferrous Carbonate. Can be made by U.S. VIII. method, but adding 5% Glucose at end of the process instead of the 80% of Cane Sugar. Is useful for capsule and pill making.—P.J. ii./05,134.

Uses.—For anæmia and chlorosis of young women. The dose may be increased up to 10 grains daily of Anhydrous Ferrous Carbonate.

Capsules and Tablets of Saccharated Iron Carbonate, contain 5 grains (**0·3 Gm.**).

Pilula Ferri (*Off.*). *Syn.* BLAUD'S PILL.

Dose.—5 to 15 grains (**0·3 to 1 Gm.**).

Each 5 grains contain about 1 grain of Ferrous Carbonate.

When palpitation occurs in connection with anæmia or chlorosis, the frequent employment of iron pills or of powders of reduced iron will probably remove the cause and so allay the symptoms.—Tirard, Med. Treatment.

For the original Formula for Blaud's Pill, the Estimation of, and Effects on the Blood, see Vol. II.

Capsules of Blaud Pill each equal to 5 grains of the official pill are also prepared.

Tablets, 4 and 8 grains. *Dose.*—1 to 4 four-grain, or 2 eight-grain Tablets, also made ℙ1 4 gr. with Arsenious Acid $\frac{1}{64}$ gr. *Dose.*—1 to 4.

Capsules are also made in the following combinations :—

Blaud Pill 5 grains with Aloes, $\frac{1}{2}$, or 1 grain.

ℙ1 „ „ 5 grains with Arsenic $\frac{1}{100}$, $\frac{1}{50}$, $\frac{1}{30}$ grain.

„ „ 5 grains with Cascara Extract, 3 grains.

„ „ 5 grains with Cod Liver Oil, $\frac{1}{2}$ dr.

ℙ1 „ „ 5 grains with Nux Vomica Extract, $\frac{1}{4}$ grain.

„ „ 5 grains with Quinine Sulphate, 1 grain.

Ferri Citras. *Average dose.*—4 grains (**0·25 Gm.**).

Contains ferric citrate corresponding to not less than 16% metallic iron. Garnet red scales with slight ferruginous taste. Soluble in water.

Ferri et Ammoni Citras. (*Off.*) U.S.

Dose.—5 to 10 grains (**0·3 to 0·6 Gm.**). Yields 31% or 32% ferric oxide. (*Off.*) Contains 16 to 18% metallic iron (U.S.). Dark red scales soluble in about half their weight of water.

The amounts used in the B.P. for making this corresponds to the formula $(NH_4)_3 2FeC_6H_5O_7$. Preparations have been made in which the Ammonium is quantitatively replaced by Lithium, Sodium and Potassium forming neutral products, hence formula assumed to be correct. The alkali (Hydrate Carbonate or Bicarbonate can be used) should be added before the Iron is "nearly dissolved."—the solution of the latter being hot, not cold.—R. C. Cowley, C.D. i./11,315.

Flavoring.—Is practically tasteless.

In ordinary cases of debility and anæmia. Especially preferred in lingering cases of gastric catarrh after alkalis have ceased to benefit and the stomach is not ready for an acid tonic. Also with Sodium Salicylate in subacute rheumatism of children.

Ferri et Ammonii Citras Viridis.

Dose.—5 to 10 grains (**0·3 to 0·6 Gm.**).

Hypodermically ½ grain in solution, but *for this purpose it must be neutralised.*

Sterules ½ (**0·03 Gm.**) and 1 grain (**0·06 Gm.**) in 1 Cc., also 2 grains with 1% Quinine-Urea, and both with Strychnine Hydrochloride $\frac{1}{60}$ grain (**0·001 Gm.**).

Ferri Hydroxidum cum Magnesii Oxido, *see* Antidotum Arsenici, p. 192.

Ferri Perchloridum. *Syn.* Ferri Sesquichloridum, Ferrum Sesquichloratum. $Fe_2Cl_6,12H_2O=540·632$.

Dose.—2 to 8 grains (**0·12 to 0·5 Gm.**).

Deliquescent yellow masses made by evaporating the stronger official solution and crystallizing.

Incompatible with infusions, &c., containing tannin, with the alkalis, alkaline carbonates, iodides, salicylates and mucilage of acacia. Ferric Chloride with Potassium Iodide in presence of Potassium Citrate produce a Potassium Ferricitrate and hence compatible.

Uses.—A well-known tonic in anæmia and rickets, has astringent action and is a useful styptic (it may be used in the solid form).

In erysipelas large doses of Iron Perchloride Tincture probably aid phagocytosis.—Whitla, Pract. Med.

The perchloride is the most diuretic preparation of iron.—H.

Iron decreases the elimination of uric acid, which may account for the production of headache in rheumatic patients under its influence.—H. Its administration may bring on an attack of gout.—W.W.W.

For gastric ulcer, whether deep or superficial, with or without hæmorrhage, the stomach should be emptied by a soft sound. By means of a funnel 100 Cc. of a solution of Ferric Chloride 1 in 1,000 are introduced. This is removed, and the operation repeated till the liquid comes out clear, *i.e.*, usually after about five washings with the solution. 500 or 600 Cc. will usually control even the most severe hæmorrhage, and this is repeated for 4 or 5 days.—Pr. Nov. '08,679.

T. H. orders for **Nebula Ferri Perchloridi,** 5 grains and Glycerin 15 minims; for **Pigmentum Ferri Perchloridi** 60 grains to 120 grains of this salt to each ounce of solution.

Glycerinum Ferri Perchloridi, G.H., has Ferric Chloride 1, Glycerin to 5. For use as a paint. Glycerin and chloroform water cover its metallic astringent taste.

Löffler's Pigment for Diphtheria.

Menthol 10, Toluol *q.s.* to 36, Ferric Chloride Solution 4, Absolute Alcohol to 100. To apply on wadding every 3 hours. Painful in use. Dilute Hydrogen Peroxide is preferable.

Diphtheritic throats swabbed with Antitoxin (the patients receiving also injections simultaneously) compared with those swabbed with Loeffler's Solution and other antiseptics showed that those treated with Antitoxin took almost 24 hours longer to clear—which might be expected, as Diphtheria Antitoxin is not bactericidal.—B.M.J. ii./11,163.

'Collapsubes' with rectal tube contain Ferric Chloride 1 in 40 with vaseline basis for piles.

Gossypium Stypticum. *Syn.* GOSSYPIUM FERRI PERCHLORIDI. Saturate Absorbent Wool 85, with Water 100 containing Ferric Chloride 15 and dry. **Linteum Stypticum** is made similarly.

(In **Ph. Ned.** Gossypium Stypticum contains at least 2% Quinine Hydrochloride, and no iron.)

Liquor Ferri Perchloridi Fortis (*Off.*). Contains 20% Fe. Has Sp. Gr. about 1·49. Its yield of Fe_2O_3 is 1·42 Gm. from 5 Cc. **Liquor Ferri Chloridi. U.S.** Contains not less than 10 Gm. Fe in 100 Gm.

Average dose.—1½ minims (**0·1 Cc.**).

Liquor Ferri Perchloridi (*Off.*).

Dose.—5 to 15 minims (**0·3 to 1 Cc.**).

Contains about 5% Fe. Strong Solution of Ferric Chloride 1, Water to 4.

In septicæmia—in the first 24 hours 4 drachms of the official liquor divided in 12 doses; for the second 24 hours 6 drachms; for the third 1 ounce. All cases were successful.—L. ii./04,1248.

Ringworm treated by first cleaning the scalp with Petrol and apply Strong Ferric Chloride Solution. *Do not wash the head* during the treatment. The patches affected should be treated every second day for three times, afterwards every third day for six times, to generally effect cure. Dab the rest of the scalp occasionally as prophylactic. The iron-stained scurf and epidermis, will in the course of some days, come away from the scalp, leaving a healthy skin beneath.—J. H Garrett, B.M.J. i./13,390.

Tinctura Ferri Perchloridi (*Off.*).

Dose.—5 to 15 minims (**0·3 to 1 Cc.**).

A 25% dilution of strong solution of Ferric Chloride with water containing a proportion of Alcohol (14·5 Gm. Anhydrous Ferric Chloride in 100 Cc. approx. U.S. **about 13%**).

Flavoring.—Syl Aurantii Floris (double dose); Syrupus.

Owing to the fact that ferric chloride does not remove any of the acid of the gastric juice (as when reduced Iron or Blaud's Pills are given), this is preferred by many.

Thread worms are killed by rectal injection of a drachm of the tincture in 10 ounces of water.

Angio-neurotic œdema has been treated with drachm doses repeated if necessary every 20 minutes.

Strumous children with tuberculous bone disease, or chronic enlarged glands have been treated with 5 to 10 minims with 10 to 20 minims of solution of mercuric chloride *t.d.s.* given over prolonged periods.

Cutaneous erysipelas. An old effective remedy is local application of strong Solution of Ferric Chloride, also internal use of Tincture of Ferric Chloride.—E. T. Larkam, B.M.J. i./21,36.

For further uses see Ferri Perchloridum, antea.

Mistura Ferri Aperiens. U.C.H.

Magnesium sulphate 30 grains, ferrous sulphate 2 grains, diluted sulphuric acid 2 minims, peppermint water to 1 ounce. An excellent mixture for the cure of inebriety.

℞ **Mistura Ferri Arsenicalis. U.C.H.**

Citrate of iron and ammonium 8 grains, arsenical solution 3 minims, infusion of calumba to 1 ounce. *Dose*—½ to 1 ounce.

Mistura Ferri Salina. U.C.H.

Potassium citrate 22 grains, solution of ferric chloride 24 minims, chloroform water to 1 ounce. The styptic taste of iron is masked in this mixture, as a double decomposition occurs between the iron and the potash salt.

Liquor Ferri Dialysatus (B.P. 1885).—S.P. Gr. 1·047.

Dose.—10 to 30 minims (**0.6 to 2 Cc**).

Better tolerated than the strong acid preparations. Contains about 5% Ferric Oxide To be prescribed as "drops," undiluted, or mixed with glycerin.

Glycerinum Ferri Dialysati.

Dialysed Iron Solution 1, Glycerin 2. Keeps well and is palatable.

Dose.—1 drachm (**4 Cc.**).

Dialysed iron is useful as an antidote to arsenic—much superior to the moist peroxide; 1 ounce doses should be given repeatedly, preceded by a dose of common salt or sodium bicarbonate, *see also* p. 192.

Ferrum Oxydatum Saccharatum, P. Austr., P.G.V., **Saccharated Ferric Oxide.**

Dose.—10 to 40 grains (**0·6 to 2·5 Gm.**).

Dilute Ferric Chloride Solution (P.G.) 30 (by weight) with Water 150. Then add with stirring a solution of Sodium Carbonate 26 in Water 150 (towards the end of the precipitation before each fresh addition of the alkali one waits for the re-solution of the precipitate). Wash to free from Chloride, collect on cloth, press slightly, mix in porcelain dish with powdered Sugar 50 and so much Sodium Hydrate Solution (Sp. Gr. 1·17) as is required to dissolve on a water bath (not more than 5 to be used), evaporate and dry and mix with Sugar *q.s* to make 100.

Liquor Ferri Oxydati Saccharati. *Dose.*—½ ounce.

Under this name a solution is made containing about 5% of the above, flavoured with Cinnamon or Vanilla.

Liquor Ferri Pernitratis (B.P. 1898).

Dose.—5 to 15 minims (**0·3 to 1 Cc.**).

A reddish brown solution containing ferric nitrate $Fe_2(NO_3)_6 = 483{\cdot}912$ Sp. Gr. 1·107, contains 3·3% Fe. *Uses* similar to those of the solution of the perchloride.

For children in convalescence from prolonged chronic diarrhœa, 1 to 2 minim doses useful.

Vinum Ferri, U.S. VIII. *Average dose.*—2 drachms (**8 Cc.**).

Iron and Ammonium Citrate 4, Tincture of Sweet Orange Peel 6, Syrup 10, White Wine to 100.

Vinum Ferri Amarum, U.S. VIII. *Average dose.*—2 drachms (8 Cc.).
Soluble Iron and Quinine Citrate 5, Tincture of Sweet Orange Peel 6, Syrup 30, White Wine to 100.

ORGANIC IRON COMPOUNDS.

The hæmoglobin content of the blood is thought to increase by the use of some of these compounds.

Triferrin. *Syn.*—FERRI NUCLEINAS, FERRINOL.
Dose.—15 grains *per diem* after meals in divided doses.
An insoluble powder said to contain 21% of Iron and nearly 3% of Phosphorus. In anæmia and in phthisis.

Liquor Ferri Albuminati (after Dieterich. *Liquids to be weighed*). was in P. Jap. 1907 slightly modified.
Dose.—1 to 4 drachms (**4 to 15 Cc.**).
P.G.V. directs: Mix fresh Egg Albumen 75. rubbed through a sieve with water 2,000 at 50° C and add to Dialysed Iron Oxychloride Solution 50 in water 2,000 at 50° C. in a fine stream. If necessary hasten precipitation by adding Salt 4 in Water 100. Wash thoroughly with lukewarm water and test with Nitric Acid *s.a.* Dissolve ppt. in Sodium Hydrate 15% *w/w* 3, add to the clear liquid Aromatic Tincture 2, Cinnamon Water 100, Alcohol 150, and Water *q.s.* to 1,000. Is easily digested and borne by a delicate stomach.
If Solution of Ferric Chloride be used in place of the Oxychloride a clear preparation is produced.

Liquor Ferri Peptonati (after Dieterich; *Liquids to be weighed*).
Dose.—1 to 4 drachms (**4 to 15 Cc.**).
Dissolve dried egg albumen 10 in distilled water 1,000; add to this pepsin 0·5 and hydrochloric acid 14. Digest the mixture for 12 hours at 40° C. (104° F.); cool and neutralize with solution of soda; then add solution of chloroxide of iron 120 diluted with distilled water 1,000. Again neutralize exactly with diluted soda solution, collect, and wash, precipitate free from chloride.
Transfer to a tared bottle and dissolve in hydrochloric acid 1·17, warming slightly, add simple syrup 10, compound tincture of cinnamon 10, alcohol (90%) 150, and distilled water to 1,000. This solution is clear by transmitted light but opaque by reflected light.
Ferrum Peptonatum in scale form can be produced by digesting egg albumen with pepsin and dilute hydrochloric acid at 39° C. The peptone solution is neutralised and added to solution of chloroxide of iron. The precipitated peptonate is dissolved in water with a little hydrochloric acid—the solution is evaporated and 'scaled' in the customary manner.

***Hemaboloids** (T.M. 257438).
Dose.—½ ounce (**15 Cc.**) after meals. Children in proportion.
A proprietary preparation stated to contain iron derived from vegetable nucleo-proteids (½ ounce being equivalent to 20 minims of the Tincture of Perchloride of Iron, B.P. '98) with beef peptone, bone marrow extract and nuclein. Does not constipate or disturb digestion in anæmia and convalescence.
Also made [P1] **with Arsenic** $\frac{1}{100}$ grain (Arsenious Acid) and **Strychnine** $\frac{1}{60}$ grain in the ½ ounce dose. Combined hæmatinic nutritive and tonic.

Liquor Ferri Peptonati cum Quinina.
Dose.—1 to 4 drachms (**4 to 15 Cc.**)
Contains ½% of Quinine Hydrochloride.

Elixir Ferro-Manganesii Peptonati.
Dose.—1 to 4 drachms (**4 to 15 Cc.**).
Contains, in addition to Iron, 0·1% of Manganese.
A useful hæmatinic, and palatable. It replaces the Liquor in past Editions.

Liquor Ferro-Manganesii Peptonati cum Hæmoglobin (5 grains in the drachm)—suspended, will not dissolve to this extent.

Also **Liquor Iodo-Ferro-Manganesii Peptonati** [0·1% Iodine in combination ($\frac{1}{16}$ grain per drachm)]. In anæmia and chlorosis.

Extractum Ferri Pomatum is prepared by digesting iron filings in juice of sour apples. That of P.G. contains 5% iron.

Tinctura Ferri Pomata, P.G.V.

Dose.—15 to 30 minims **(1 to 2 Cc.).**

Ferrated Extract of Apples 1 part, Cinnamon Water (P.G., containing 10% of alcohol) 9 parts.

Liquor Ferri Acetatis (B.P. 1898).

Dose.—5 to 15 minims **(0·3 to 1 Cc.).**

This solution does not decompose iodides.

Pneumonia has been treated with full doses every six hours until crisis past.

Liquor Ferri et Ammonii Acetatis, U.S. BASHAM'S MIXTURE.

Average dose.—4 drachms **(15 Cc.).**

Tincture of Ferric Chloride 4, Dilute Acetic Acid 6, Solution of Ammonium Acetate 50, Aromatic Elixir 12, Glycerin 12, Water to 100. To be freshly made. Particularly useful in anæmia and chronic parenchymatous nephritis. It acts as a good diuretic and diaphoretic.—H.

Ferri Iodidum. Fe I_2=309·68.

Dose.—1 to 5 grains **(0·06 to 0·3 Gm.).**

Crystalline brown hygroscopic masses readily soluble in water.

Manufacture.—It is best to employ a wet process, *e.g.*, to combine Iron 6 and Iodine 17 in water *q.s.*, filter and evaporate to dryness. By this method the iron is kept in excess.

Clean Iron Filings, previously washed with acid if oxidised, are preferable to iron wire. Mostly prescribed as one of the following:—

Syrupus Ferri Iodidi (*Off.*).

Dose.—$\frac{1}{2}$ to 1 drachm **(2 to 4 Cc.).**

Contains Anhydrous Ferrous Iodide 5% w/w approx. F.I. requires this, 10 Cc. contain 0·7 Gm. FeI_2. It also contains now 10% of Glucose.

For suggestions re making and preservation of the Syrup, see Vol. II.

Incompatible with Sal Volatile and with Easton's Syrup—strychnine iodide, and perhaps quinine iodide are thrown out.

Capsules are prepared equivalent to 10 and to 30 minims.

Rheumatoid arthritis well treated by.—H. W.

Exophthalmic goitre and rheumatoid arthritis treated with Iodide of Iron and Arsenic, also previously with sodium salicylate, belladonna (improved under), guaiacum and ferrous iodide.—L. ii./08,1877.

Syrup of Iodide of Iron with Easton's Syrup mixed together precipitate in time, whether as such or diluted, but if both be made with glycerin they are compatible as such, but precipitate on dilution. But if a trace of hypophosphorous acid be added to the ordinary Syrup of Iodide of Iron they do not cause precipitation.—P.J. ii./09,389.

Liquor Ferri Iodidi. *Dose.*—4 to 8 minims **(0·25 to 0·5 Cc.).**

A solution for diluting 1 to 7 with Syrup to produce the above.

Suggested formula containing Hypophosphorous Acid (30%) 140 Cc. and Glycerin 100 Cc. per litre as preservatives.–G. M. Beringer.

Ferri Iodidum Saccharatum. U.S. 1890.

Dose.—2 to 15 grains **(0·12 to 1 Gm.).**

Combine Iron Wire 6, Iodine 17, in Water 20, when complete, filter on to milk sugar 40, and Reduced Iron 1, previously mixed. Evaporate to dryness and add milk sugar, *q.s.* to 100. This and a similar preparation of P. Jap. IV. contain about 20% FeI_2.

Uses.—An exceedingly useful tonic, especially in arthritis, anæmia and phthisis. May be ordered in form of cachet.

Pilula Ferri Iodidi (B.P., 1885).

Dose.—3 to 8 grains (**0·2 to 0·5 Gm.**).

Shake carefully in a stoppered bottle Iodine 80, Water 46, with Iron Wire 40; add decanted Solution to Sugar 70; mix and combine with Liquorice Powder 140. In dividing this into pills, roll them in a mixture of reduced iron and lycopodium, and varnish.

℗ **Pilula Garrodii** (Pilula Ferri Iodidi et Sodii Arsenatis E.G.A.)

Pill of Ferrous Iodide 2 grains, Exsiccated Sodium Arsenate $\frac{1}{36}$ grain, Extract of Belladonna $\frac{1}{12}$ grain.

Syrupus Ferri Bromidi, B.P.C., 1901.

Dose.—½ to 1 drachm (**2 to 4 Cc.**).

Dissolve sugar 14 ounces in Distilled Water 6 ounces; add Bromine 533 grains to Iron Wire, free from oxide, ½ ounce and water 4 ounces in a suitable vessel surrounded with cold water. Shake until the froth becomes white and the reaction is complete. Filter the solution into the warm syrup and add, if necessary, Water to produce one pint. Each drachm contains about 4½ grains of Ferrous Bromide.

Ferri Oxalas, $Fe(COO)_2\ 2H_2O = 179{\cdot}882$. *Syn.*—Ferrous Oxalate, Protoxalate de Fer. **F.E.** and **P. Hung.**

Dose.—1 to 5 grains (**0·06 to 0·3 Gm.**).

Yellow crystalline powder, insoluble in water but soluble in dilute acids. Has been given in anæmia and as a nerve tonic.

Ferri Phosphas Saccharatus. Saccharated Iron Phosphate (*Off.*).

Dose.—5 to 10 grains (**0·3 to 0·6 Gm.**).

An amorphous powder containing at least 60% of ferrous salts calculated as $Fe_3(PO_4)_2,\ 8H_2O = 501{\cdot}728$.

Ferri Phosphas Solubilis, U.S., is a green soluble sodio-citro-ferric phosphate. Contains Ferric Phosphate corresponding to 12% metallic iron.

According to Squibb the following gives a green salt. Dilute Iron Persulphate solution 135 Gm. with water 300 Cc. Pour this rapidly, with constant stirring, into Caustic Soda, U.S. 50 Gm. dissolved in water 300 Cc. in a vessel of 2,000 Cc. capacity.

Decant and wash thrice. Drain off most of the water and add the magma gradually to Citric Acid 55½ Gm. and Sodium Phosphate 76 Gm. in just sufficient cold water to dissolve. Allow to stand 24 hours at about 60° C. to dissolve and filter. Concentrate at not exceeding 60° C. and scale without heat.—P.J. ii./09,405.

Ferri Pyrophosphas Solubilis, U.S. VIII.

Contains ferric pyrophosphate corresponding to not less than 10% metallic iron. *Average dose.*—4 grains.

Syrupus Ferri Phosphatis (*Off.*).

Dose.—½ to 1 drachm (**2 to 4 Cc.**). One drachm contains 1 grain of anhydrous ferrous phosphate. Keep in bottles quite full.

Syrupus Ferri Phosphatis Compositus, B.P.C. *Syn.* Chemical Food; Parrish's Syrup (*modified*). *Dose.*—½ to 2 drachms.

Iron Wire, free from oxide 37½ grains. Concentrated Phosphoric Acid, Sp. Gr. 1·5, 1 ounce, Distilled Water 5 drachms. Place in a glass flask, so that the liquid completely covers the wire, plug with wool, and heat gently till dissolved.

Mix Precipitated Calcium Carbonate 120 grains, Concentrated Phosphoric Acid 4 drachms, Distilled Water 2 ounces, and add Potassium Bicarbonate 9 grains and Sodium Phosphate 9 grains. Then add the solution of phosphate of iron, filter and set aside.

Boil Cochineal 30 grains with distilled water 7½ ounces 15 minutes, cool and filter, pouring over the filter sufficient water to produce 7 ounces. To this add refined sugar 14 ounces.

Heat till dissolved and strain. When cold, add the solution of phosphates, Orange Flower Water 1 ounce, and sufficient water to measure 1 pint.

Cudbear is better than Cochineal. Mix with an equal quantity of clean sand and percolate.—F. Goldby, P.J. i./15,576. The addition of orange flower water to the original formula has made the final volume incorrect.—*ibid.*, 518.

Contains in each drachm ½ grain Iron Phosphate and ⅘ grain Calcium Phosphate with small quantities of the phosphates of potassium and sodium. It should be kept in bottles quite full. A small proportion of glucose added, assists keeping qualities. It is not too nauseous to administer to children, for whom it is frequently prescribed.

Acidity.—The ordinary preparation, as sent out by manufacturers, contains about 3½% free Phosphoric acid, apart from another 2½% approximately, associated with the bases to form acid salts of Lime and Iron. 3½% Free Phosphoric Acid means that each drachm of the syrup contains the equivalent of 20 m. of dilute Phosphoric acid.–A. J. Jones, P.J. i./22,61. A speaker said he made the syrup only ¼ the strength of Syrup of Ferrous Phosphate in iron, and in the case of the Phosphoric acid he used 3 ounces instead of 5 ounces. ***Ibid*** p.63.

For estimation of Iron and Calcium in this Syrup, see Vol. II.

Capsules of Chemical Food are each equivalent to 1 drachm.

Ⓟ **Syrupus Ferri Phosphatis cum Quinina et Strychnina.** (*Off.*).

Syn. EASTON'S SYRUP, SYRUPUS TRIUM PHOSPHATUM.—G.H.

Dose.—½ to 1 drachm (**2 to 4 Cc.**).—One drachm represents 1 grain of anhydrous ferrous phosphate, ⅘ grain Quinine Sulphate and $\frac{1}{3\cdot2}$ grain Strychnine. As this Syrup becomes discoloured it is more satisfactory to make only small quantities at a time. Sp. Gr. approx. 1·290.

The acid liquor is officially filtered into the syrup, and afterwards made up to a pint. If the solution is made up to *about 6 ounces* filtration is much *more rapid* and exposure to air less.—C.D. i./05,464.

U.S. VIII. employed Ⓟ Glyceritum Ferri, Quininæ et Strychninæ Phosphatum 25, *q.v.*, Syrup to 100. *Average dose.*—1 drachm.

(Easton's Syrup has been dismissed from the U.S.P.)

Flavoring.—One drachm requires Syl Aurantii Amari 2 or 3 drachms and water to 1 ounce (or less). Extractum Glycyrrhizæ Liquidum covers, but not so good as Syl Aurantii Amari.

It improves the coagulability of the blood. The excess of acid in this Syrup is said to be injurious to the teeth.

With Syrup of Iodide of Iron (*q.v.*) also made with Glycerin is compatible in the concentrated form, but not if diluted.

Ⓟ **Liquor pro Syrupo Eastoni.** 3 with 7 of Simple Syrup= **Easton's Syrup** (*i.e.*, 144 minims with Simple Syrup *q.s.* to 1 ounce).

Add to a Solution of Ferrous Phosphate 5 ounces (produced by dissolving Iron Wire 150 grains in Phosphoric Acid, Sp. Gr. 1·5, 2¼ ounces and water *q.s.* to 5 ounces), **Liquor Eastoni sine Ferro** 7 ounces (made by dissolving Strychnine 10 grains and Quinine Sulphate 260 grains in Phosphoric Acid warmed, 2 drachms and adding water *q.s.* to 7 ounces). Is better recently prepared. The Solution of Ferrous Phosphate keeps for a moderate time in stoppered bottles, which should be as full as possible to prevent exposure to the air.

Liquor Eastoni sine Ferro.—Some recent protracted experiments by us showed that this Liquor can be kept almost colourless by using Sulphurous Acid (5%) in proportion of 1 minim in 3 ounces. This is better than Hypophosphorous Acid, which has been used by some. The bottle must be kept stoppered, *i.e.*, air must not have access to the Liquor.

Hypophosphorous Acid and Sulphurous Acid must not be used together.

Easton's Syrup in Two Syrups.

(*a*) Mix Liquor Ferri Phosphatis 5 with Syrup *q.s.* to 20.

(*b*) Mix Liquor Eastoni sine Ferro 7 with Syrup *q.s.* to 20.

These keep well separately. Mix at time of dispensing.

Ⓟ **Syrupus Triplex.** Understood to mean a mixture of equal parts of Easton's, Fellows' and Parish's Syrups. **Edin. Royal Infirmary** has 1, 1 and 2 respectively.

Physicians should specify in prescribing which formula is intended.

Ⓟ **Elixir Ferri Phosphatis cum Quinina et Strychnina.**—*Martindale. Dose.*—½ to 1 drachm (**2 to 4 Cc.**).

The same strength as the official Easton's Syrup. Prepared with Simple Elixir ('94) in place of Syrup as a vehicle.

Easton's syrup has its equivalent dose in the following pill, which is portable, tasteless, and readily soluble:—

℞ **Pilula Ferri Quininæ et Strychninæ Phosphatum.** Easton's Pills.—*Martindale.*

Contain Ferrous Phosphate and Quinine Sulphate of each 1 grain (**0·06 Gm.**), Strychnine $\frac{1}{32}$ grain (**0·002 Gm.**), Milk Sugar 1¼ grains (**0·08 Gm.**), Concentrated Phosphoric Acid *q.s.*

Mix quickly, having first triturated the Strychnine with the Milk Sugar and prepare the pills. Finally varnish with Sandarach Varnish. Also made one-half this strength. Either may be combined ℞ with Arsenious Acid, $\frac{1}{60}$ grain (**0·001 Gm.**).

Ⓟ **Glyceritum Ferri, Quininæ et Strychninæ Phosphatum. U.S. VIII.** *Syn.*—**Glycerole-Easton.**

A substitute for the syrup for administration where sugar is not desirable. It keeps better than the syrup and is palatable.

Average dose.—15 minims (**1Cc.**) containing approximately Soluble Ferric Phosphate 1¼ grain (**0·08 Gm.**), Quinine as Phosphate 1½ grain (**0·1 Gm.**), Strychnine base $\frac{1}{60}$th grain (**0·001 Gm.**)

℞ **Tablets of Easton's Syrup** are each equivalent to ½ and 1 drachm of the syrup. (Sugar coated.)

℞ **Capsules** equivalent to ½ and 1 drachm of Easton's syrup are also prepared and each **combined ℞ with arsenic $\frac{1}{50}$ grain.**

℞ **Pilula Trium Phosphatum, G.H.** Is similar to our Formula for Easton's Pills.

Ferri Sulphas (*Off.*), $FeSO_4, 7H_2O = 278·012$. **Ferrous Sulphate.** *Dose.*—1 to 5 grains (**0·06 to 0·3 Gm.**).

In clear, pale, bluish green crystals, soluble 1 in 1½ of water.

A saturated solution with some crystals of the salt in excess keeps better than a weak solution, in the latter oxidation soon takes place.

Flavoring.—Glycerin or Syrup.

Relieves anæmia more thoroughly than carbonate or phosphate.—1% solution of Ferrous Sulphate prevented development of ankylostoma ova and all died in 24 hours.—L. i./10,355.

Ferri Sulphas Exsiccatus (*Off.*). P. Jap. IV. *Dose.*—½ to 3 grains (**0·03 to 0·2 Gm.**). 5 grains=8 of the preceding.

Best administered in pill, as:—

Pilula Ferri Sulphatis 3 or 5 grains, with syrup *q.s.* Dissolving slowly, these pills do not derange the stomach. If made with lanolin or kaolin ointment as excipient will not crack.

Liquor Ferri Subsulphatis, U.S. **Monsel's Solution.**

Dose.—3 to 6 minims (**0·2 to 0·4 Cc.**).

A solution of basic ferric sulphate. When evaporated and scaled forms **Monsel's Salt** or **Ferric Subsulphate** $Fe_4O(SO_4)_5$.

A spray of 20 grains to the ounce checks hæmoptysis, and internally is not irritating although astringent.

Unguentum Ferri Persulphatis.—Ferric Sulphate 10 grains, Almond Oil ½ drachm, Conium Ointment to 1 ounce.—Prov. Hosp. (General Hosp., Notts.).

The name Persulphate may be taken to mean normal **Ferric Sulphate** $Fe_2(SO_4)_3$ as contained in Liquor Ferri Tersulphatis, U.S.

Ferri et Magnesii Sulphas. $FeSO_4MgSO_4,6H_2O=380·376$.

Dose.—2 to 10 grains (**0·12 to 0·6 Gm.**).

A double salt containing about half its weight of each sulphate; green crystals, soluble 3 in 4 of water.

In 10-grain doses has no astringent or aperient action, hence suitable for prolonged use in chlorosis and anæmia.

Ferri et Manganesii Citras.

Dose.—3 to 15 grains (**0·2 to 1 Gm.**).

In reddish scales, freely soluble in water. Useful in chlorosis, combining the action of the two elements.

Ferro-Alumen. **Iron Alum.**—*Syn.* Ferric Ammonium Sulphate. $Fe_2(SO_4)_3.(NH_4)_2SO_4.24H_2O=964·384$.

Dose.—3 to 10 grains (**0·2 to 0·6 Gm.**). Amethyst coloured efflorescent crystals, of astringent taste. ***Soluble*** 1 in 3 of water (best with a little sulphuric acid added), insoluble in alcohol. Internally to arrest hæmorrhage, also as an astringent gargle (2%), throat spray or pigment.

Ferri et Potassii Tartras. (*Off.*) Ferrum Tartaratum, 1898.

Dose.—5 to 10 grains (**0·3 to 0·6 Gm.**).

Reddish brown scales soluble in water about 1 in 1. Prepared by evaporating a solution of Ferric Hydroxide in Acid Potassium Tartrate. 10 Gm. incinerated yield not less than 3 Gm. of Residue.

Menorrhagia of young females is well treated by this tartrate.

For mucous disease, this or the Ammonio-Citrate is given with alkali in Calumba Infusion.

Tinctura Ferri Tartarata.—Ferrous Sulphate 8, Potassium Bitartrate 4, Distilled Water 30. Digest 24 hours in a covered vessel, then add Alcohol 68% 70, stand one hour and filter.

Ferri et Ammonii Tartras U.S. VIII. *Average Dose.*—4 grains. Contains not less than 13% metallic iron.

Molybdenum (Mo=96·0). This metal is found chiefly as its Sulphide **Molybdenite** MoS_2. It is employed for hardening steel. Unlike ordinary Carbon Steel, Molybdenum Steel has the property of retaining its temper even when heated to a high degree, hence cutting tools made with it are able to make deep cuts at high speed—the steel may in fact be heated to dull redness without impairing its quality. Molybdenum has Sp. Gr. 8·6.

FILIX MAS.

The rhizome of *Dryopteris* (*Aspidium*) *Filix-mas*. The Male Fern.

Extractum Filicis Liquidum (*Off.* and B.P. '98).

Dose.—45 to 90 minims (**3 to 6 Cc.**).

Prepared by ether extraction—the yield being about 9 to 10%

It contains *Off.* not less than 20% of **Filicin**, the anhydride of Filicic Acid. This is stated to be inactive as a vermifuge. **Filicic Acid** has been given in dose of 5 to 15 grains (**0·3 to 1 Gm.**), but it is not so good as the Liquid Extract.

Oleoresina Aspidii, U.S. is also made by ether percolation.

Average Single Dose.—30 grains (**2 Gm.**) once a day.

Assay and methods for detecting adulteration of, vide Vol. II.

Flavoring.—The taste of this preparation is horrible. Best prescribed as capsule, or if in a mixture or draught best ordered with Mistura Amygdalæ, with perhaps a little Essential Oil, *e.g.*, Cinnamon.

For all varieties of tapeworm and the *ankylostomum duodenale* may be administered fasting, in capsules, or emulsified with about half its weight of compound tragacanth powder. This and the anthelmintics below should be preceded and followed by a brisk purgative.

For tape-worm the following routine has been advised. Light food at tea time—purgative at bedtime (Magnesium Sulphate and Jalap suitable), purgative again in morning, after action give vermifuge. Liquid Extract of Male Fern 1 drachm, Mucilage of Acacia 1 drachm, Cinnamon Water to 1 ounce. After passage of the worm give Castor Oil to remove remaining vermifuge from the bowel. N.B.—We do not consider Castor Oil ideal for the purpose. At any rate, it is not advised *before* or *with* a Filix Mas preparation.

Capsules contain 15 minims (**1 Cc.**) of Liquid Extract. *Dose.*—1 to 4.

Yeo mentions Capsules of 7½ minims of Male Fern Extract with 1 grain of Calomel. Sixteen of these are taken for a dose—two every ten minutes.

Male Fern Extract (40 minims in an ounce of milk flavoured with Peppermint Oil, 2 minims) must be given on an *empty* stomach. An aperient, magnesium sulphate or sodium sulphate, should be taken first in a good quantity of water (8 to 10 ounces).—B.M.J. i./17,624.

Tuberculous conditions are stated to have benefited under treatment with ether-alcohol extract of fresh plant. Children to receive ¾ grain, adults 1½ grains, in pills, twice daily for 10 to 15 consecutive days each month.

Distomiasis (Liver-rot) in sheep and cattle is effectually treated by the Extract.

Dangers of Filix Mas. Moderate doses almost invariably produce bilirubinæmia and in large doses jaundice. There is risk of chronic cirrhosis of the liver developing.—O. Hannsen, L. ii./22,1188.

We learn from Dr. Wakeman that the tape worm is rife in Abyssinia. All the natives suffer from it. They drink cold infusions of Kousso but this seldom brings away the head of the worm—hence they are obliged to dose themselves to bring away the segments which are formed. They much prefer Male Fern capsules when they can get them—these act effectively especially when followed by 1 to 2 drachms Compound Jalap Powder, but the capsules are too large and the ether in the extract causes eructations (it should not be there—W.H.M.). **Pills and Tablets** containing 3 minims of Male Fern Extract are suggested. These are of convenient size—three or four for a dose.

Haustus Filicis Maris, L.H. Liquid Extract of Male Fern, 1 drachm; Syrup of Ginger, 1 drachm; Tincture of Quillaia, ½ drachm; Peppermint Water to 1 ounce.

Mistura Filicis, U.C.H. *Dose.*—1 ounce.

Liquid Extract of Male Fern 1 drachm, Powdered Acacia 1 drachm, Chloroform Water to 1 ounce.

Other tæniacides are **Kamala** (discarded from B.P.), the glandular red powder attached to the capsule of *Rottlera tinctoria*; *Mallotus Philippinensis* (*Euphorbiaceæ*); this may be given in dose of 30 to 120 grains suspended in water; **Cowhage, Dolichos pubes,** the hairs adhering to the pod of *Dolichos* or *Mucuna pruriens* (*Leguminosæ*), *dose* 1 or 2 grains in treacle or honey; **Papain,** and **Thymol Carbonate,** *q.v.*, but the most efficient tæniacide is **Pelletierine Tannate,** *q.v.*, *cf. also Carbon Tetrachloride and Oleum Chenopodii.*

Toxicology of Filix Mas. A case seriously affected.—L. i./11,109.

Poisoning from use of Male Fern Extract in Castor Oil—the case was actually Addison's disease and not parasitic infection.—B.M.J.E. i./15,44.

GELATINUM (*Off.*). U.S.

Nearly colourless transparent sheets or shreds made by extracting animal tissues, bones, etc., with boiling water.

Skin Gelatin is the best. It is more pliable and possesses more 'fibre.' This variety is suitable for gelatin capsule making. Bone gelatins made from **Osseine** (acidulated bone) are brittle and hence unsuited.

Dose.—Ad libitum *per os*, and injected.

Sterules of Concentrated Saline Gelatin Solution are prepared for injection into the gluteal region as a hæmostatic; each makes a 2% solution on dilution with boiled water to 5 ounces—sufficient for one injection at 103° F. Injections of this amount are made every third day in the flank or buttock until 30 or 40 injections have been made.

These constitute the great standby in treatment of hæmoptysis of tuberculosis.—English's System of Treatment, vol. i., 1154.

G. W. Davis (Lancet, Sept. 8, 1900) employed 6 ounce subcutaneous injections of 1% Gelatin with Cerebos Salt 0·3% approximately, in the treatment of hæmorrhage.

The solution is sometimes used stronger, *e.g.*, 10%,—*i.e.*, the

contents of the tube to be diluted to 1 *ounce* (30 Cc.). This would appear too strong for general use.

Gelatina Soluta Sterilisata, P. Helv. Is 10% in Normal Saline. The utmost precautionary directions are given, including animal experiments, to exclude organisms of malignant œdema and tetanus.

Liquor Gelatinæ Sterilisatus, P. Jap, IV. is similar but strength of Sodium Chloride 0·5%. The Solution is neutralised with Sodium Carbonate and filled into hard glass tubes containing 10 to 40 Cc. sealed and sterilised thrice each time for 15 minutes at 24 hour intervals. The name of the laboratory and volume of contents to be given on each tube.

Uses.—To check bleeding from the lungs, from the intestines in typhoid and dysentery, from the bladder and from the stomach in ulcer and cancer of that organ. These injections may be followed by pain, fever, local swellings and nettle rash. Other hæmostatics may be combined with it.

Aortic aneurism is relieved by subcutaneous injection of the solution.

Secondary hæmorrhage well treated. Blood which ordinarily coagulates in 7 minutes clots in 3 minutes after an injection. Dose is about **5 Gm.** in a 1% solution. Very useful in cases of ruptured tubal pregnancy.—L. ii /08,1782.

Intrathoracic aneurysm. The solution advised by Lancereaux in 1904 consists of Gelatin 25, Sodium Chloride 7, in Water 1,000 (=2·5%). He injects 200 Gm. at a time and repeats every 4 or 5 days. Sir J. K. Fowler begins with 50 Cc. of 2% Solution and gradually increases to 100 Cc. and 4% respectively. Guthrie Rankin says the relief of pain is striking.—F. De Havilland Hall, L. i./13,947.

It is the most powerful *protein-sparer* known, being able to save from destruction half its weight of proteid or twice as much as is spared by an equal quantity of carbohydrate; One gramme yields about 4·1 Calories.—R. Hutchison.

For gastric ulcer gelatin is very easily digestible. A diet of gelatin, fat and sugar has been advised. It ' fixes ' a great deal of acid.

Intestinal bleeding has been arrested by administration by the mouth.

Snake bite: Oozing hæmorrhage due to this occurs from all mucous membrane well treated by large quantities of 5% Gelatin Solution *per os.*—B.M.J. i./15,632.

Gelatin Solution 5 to 10% containing 5% Calcium Chloride. To arrest hæmorrhage.—*Vide* **Calcii Chloridum,**

Formalised Gelatin.—This has been used with success as a substitute for Collodions. Gelatin Solution 10% in water is stored in wide mouth test tubes holding three ounces each. The tubes are plugged with cotton wool and sterilised at 100° C. for 15 minutes on three successive days. When required for use melt in a water bath and add 1 drachm of Formalin Solution diluted 10 times—*i.e.*, 4% strength of Formaldehyde approx.—the final product will then contain a little over 1% of Formaldehyde (H.COH) or fully 2½% of Commercial Formalin.

The wound is dressed with a thick roll or pad of sterilised gauze, with a piece of stiff gauze above extending beyond the wound. The Formalised Gelatin is applied with a swab on the top of the stiff gauze beyond the limit of the wound,—this holds the dressing in place without bandage.—Communicated by the Dispenser, General Infirmary, Leeds.

For **Formalised Gelatin Capsules** *vide* Formagules.

* **Vernisol** (T.M. 221492).—A water-soluble varnish, a preparation in form of a jelly which dries and leaves a transparent, flexible coating, non-irritating, and may be medicated with the usual dermatological agents.

GELSEMII RADIX. (*Off.*). U.S.

Dose.—5 to 15 grains (**0·3 to 1 Gm**) *N.B.*—U.S. gives ½ grain only as average dose.

The dried rhizome and roots of "yellow jasmine"—*Gelsemium nitidum* (*Loganiaceæ*) (*G. sempervirens*, Aiton) (*Loganiaceæ*) imported from the United States, must be distinguished from the yellow jasmine cultivated here, which is a species of *Jasminum*.

Uses.—Has febrifuge properties, as it lowers the pulse and depresses the nervous system, being anti-spasmodic and analgesic. It has been much used in acute and rheumatic neuralgia, toothache, uterine and ovarian pain and chorea. It is a powerful paralyser, as well as tetanizer, and respiratory poison. Large doses contract the pupil and cause giddiness and diplopia.

The plant contains at least two alkaloids, one designated **Gelseminine** (crystalline), which is highly toxic, the other (Gelsemine), which is of little importance.

Antidotes.—Emetics, Atropine or Strychnine hypodermically, repeated, and Nitroglycerin; or Amyl Nitrite; artificial respiration, stimulants.

℞ **Gelseminina.** $C_{22}H_{26}N_2O_3 = 366{\cdot}334$ (Alkaloid).

This base is called by some '*Gelsemine*.' This causes unnecessary confusion.

Dose.—$\frac{1}{100}$ to $\frac{1}{32}$ grain (**0·0006 to 0·002 Gm.**).

Yellowish-white minute crystals, M.pt 160° C., with a bitterish taste, sparingly soluble in water, easily soluble in alcohol, ether, and dilute acids. It forms crystalline salts, and has mydriatic properties.

℞ **Gelsemininæ Hydrochloridum.** $C_{22}H_{26}N_2O_3.HCl$ (?) = 402·802.

Dose.—$\frac{1}{60}$ to $\frac{1}{20}$ grain (**0·001 to 0·003 Gm.**).

In white, granular crystals, freely soluble in water.

℗ **Ophthalmic gelatin discs** contain $\frac{1}{500}$ grain **Gelseminine.**

℗ **Gelsemin; Extractum Gelsemii Pulvis.** *Dose.*—½ to 2 grains (**0·03 to 0·12 Gm.**) in a pill with spirit and glycerin.

The powdered alcoholic extractive (resinoid) of a pale brown colour.

Must be distinguished from the alkaloids. To be prescribed as Gelsemin 'Extractive.'

℗ **Extractum Gelsemii Liquidum.** By percolation with a mixture of Alcohol 4 and Water 1. Strength 1=1. *Average dose*—½ minim (**0·03 Cc.**).

Dysmenorrhœa is well treated by 3 minims of this liquid extract with 3 to 5 minims of Tincture of Belladonna thrice daily. Will often relieve pain in the most obstinate cases

For nervousness before examination a small dose thrice daily is stated to be a useful tonic.

℗ **Tinctura Gelsemii** (*Off.* and B.P. 1898).

Gelsemium in No. 40 powder 2, Alcohol (60%), *q.s.* to 20. Percolate. The tincture is fluorescent.

Dose.—5 to 15 minims (**0·3 to 1 Cc.**), often combined with bromide of ammonium or potassium for neuralgia.

Flavoring.—Syl Anethi, Syl Rosæ; Syrupus Aurantii.

For neuralgia of face and jaws associated with carious teeth—15 minims of the tincture every 6 hours rarely fails to give relief.

Disordered vision may follow even moderate doses.

In the knowledge of the writers a case of neuralgia has been treated by ½ drachm doses thrice daily for two months.

In rheumatoid arthritis S. Ringer recommended this with Cimicifuga *q.v.*

INFLUENZA well treated by the following:—

Gelsemium Tincture 12 minims, Belladonna Tincture 5 minims, Potassium Citrate 10 grains, Syrup of Orange 1 drachm, Chloroform Water to 1 oz. *Dose.*—1 ounce every four hours. Afterwards ½ oz. until temperature falls to normal. Headache and backache vanish, with general improvement. The only disadvantage is that Gelsemium may cause ocular disturbance.—W. D. D. Small and W. O. Blanchard, B.M.J. i./19,241.

GLUCOSUM.

Syn. DEXTROSE, GRAPE SUGAR. $C_6H_{12}O_6$=180·126.

Liquid Glucose occurs as a viscous mass containing about 20% moisture and of Sp. Gr. 1·6 approx. It is prepared by acting on Starch with Dilute Hydrochloric Acid. Further varieties are **Pure Dextrose** in white 'granular' powder, and **Solid Glucose** less pure in yellowish masses containing 10 to 20% of bodies allied to Dextrin, viz., Amylin and Gallisin.

GLUCOSE of commerce (Liquid) is of two kinds, '**Crystal**' and '**Neutral**' 'Crystal' is the neutral variety bleached with Sulphites. It is 'water-white' and contains up to 7 grains Sulphur Dioxide per lb. The neutral is of pale yellow colour and is usually free from traces of Sulphur Dioxide. Its flavour is superior to the crystal variety. It has approximately a quarter the sweetness of refined sugar and it is not so good a preservative. Analyses of Crystal Glucose showed Dextrose 34 to 48%, Dextrin 30 to 45%, Sulphur Dioxide free and combined 0·03 to 0·1%, Moisture 14 to 20%.—H. H. Robins, C.D., Mar. 31/17.

If Cotton Wool is treated with Sulphuric Acid one vol. and water 3 vols. a viscous solution is produced which becomes later as fluid as water. From this Glucose is obtained.—C. T. Cross, C.D. i./17,252.

Glucose Sterules are prepared for artificial feeding as a preliminary to severe operations, for the resultant shock, and for wasting diseases. The glass tubes (originally suggested by A. E. Barker) can be carried about for every serious operation. The contents of a tube are diluted to a pint with boiled water to make a 5% solution (which strength is isotonic with the blood) and as much as a litre of this solution may be injected, and has never been found to cause any evidence of sugar in the urine. An ordinary aspirator needle about 1 mm. in transverse section of its lumen, attached to 3 feet of rubber tubing with a suitable glass reservoir above are all the apparatus required. The needle is introduced under the skin of the arm near the axilla—the skin having been previously carefully cleansed—the

douche is then raised 2 feet or so and the transfusion proceeds easily. The effect of the treatment is good as regards pulse, general strength and relief of thirst. By this means water, the first need of the system, can be given in large amount and with perfect safety and sugar to the extent of 2 ounces per diem—an important food without any demand upon the alimentary tract. Increased action of the kidneys caused and consequent carrying off of diluted toxic matters.

The solution is also used *intravenously* with the addition at the time of dilution of 4 to 8 drops of Adrenalin Solution.

Gastric Ulcer has been treated by giving nothing, not even water by the mouth, and supplying 3 or 4 pints daily of Saline Sugar Solution—the method gives the ulcer every chance of healing. Secondary parotitis may however occur, special care is hence necessary to use antiseptic mouth washes.

The method should be valuable in treating ailments in which natural feeding is difficult, *e.g.* in the hyperemesis in pregnancy and in cholera.

Delayed Chloroform Poisoning treated by rectal injection of Sodium Bicarbonate. Also Glucose Solution ½ ounce in ½ pint of Milk by nasal tube and a 10% solution by the rectum four-hourly, in addition to a good supply of Carbohydrate food. Improvement nothing short of marvellous, and recovery perfect.—L. ii./09,710.

Cyclic or Recurrent Vomiting. All food should be withheld from the stomach and rectal feeding substituted. Glucose should be added to the Normal Saline for rectal use not only as food, but because the adequate use of fat requires co-operation of active Carbohydrate metabolism.—P.R.S.M. Diseases of Children Sect., Feb. '10,85.

Perforation of the Stomach and Duodenum. The Injections help to raise vascular tension lowered by sweating, vomiting and toxæmia.—A. E. Barker, B.M.J. i./13,106.

Sugar is excreted by the urine after repeated injections, but only to the extent of 2 to 3% of the quantity injected.

Severe Diabetes treated, especially in cases where acidosis threatened.—Sir W. H. Willcox, B.M.J. ii./21,706.

In Pneumonia the heart can be best helped by giving it food and oxygen. The best food is sugar. Intravenous injections of 10% Glucose are perhaps the most valuable when circulatory failing has commenced.—W. H. Wynn, L. ii./22,496.

Cardiac failure. 1 drachm doses of 5% solution *per os* apparently saved life.—G. Scott MacGregor, B.M.J. i./21,158; see also S. E. Denyer, *ibid* 248.

Vomiting of pregnancy. Glucose injections useful.—V. J. Harding and B. P. Watson, L. ii./22,649.

Glucose tolerance in chronic arthritis. A lowered glucose tolerance is present in a large proportion of cases.—G. L. Kerr Pringle and S. Miller, L. i./23,171.

Value of rectal feeding. Absorption of Dextrose (5% solution in Saline Solution when so given) is proved by the way it raises respiratory quotient and abolishes or diminishes acidosis; on the other hand protein absorption is either nil or exceedingly minute,—the salts in foods of this kind are absorbed and probably produce what good is done,—there is indeed no place in therapeutics for nutrient enemata containing protein and fat.—B.M.J. i./11,872.

Glucose as Surgical Dressing.—The wound is dusted with powdered glucose and covered with strips of protective silk, having been first cleaned with tampons soaked in hot boiled water. May be painful. In some cases antiseptics may be wanted before the glucose. The sugar acts as a nutrient to the tissues. Also used as **moist dressing**—L. i./13,651.

Ulcers dressed with 40% Glucose; also to replace the Liquid Paraffin in B.I.P.P.—B.M.J. ii./18,574.

The degree of lymph lavage produced by 5% Saline Solution was not great. A substance with greater osmotic power—*e.g.*, liquid glucose—found preferable (with 1 in 80 Carbolic Acid). Gun-shot wound.—H.B. Whitehouse, L. i./15, 850.

Bromidrosis, ozæna, otorrhœa treated by swabbing with 25% Glucose solution. Chronic vaginal discharge treated by 25% Glucose Pessaries in gelatin basis.—T. H. C. Benians, B.M.J. i./18,669.

For Estimation of Glucose in Urine *see* Vol. II.

Dextrin (P. Helv.).—Yellowish powder or gum-like masses. Is obtained commercially by heating starch to 200° C. According to P.G.I. it is made by heating potato Starch 150, with Oxalic Acid 4 in water 750 with frequent stirring until a little of the mixture no longer gives blue with Iodine. Dextrin takes up some Iodine without colouring. It is necessary to first saturate the liquid with the Iodine and then add a slight excess to get the coloration. Neutralise with calcium carbonate and evaporate the filtered liquor. Consists principally (there are various other dextrins formed before this) of Achroodextrin which is the ultimate product of starch hydrolysis before the grape sugar stage is reached.

GLYCERINUM.

$C_3H_5(OH)_3 = 92{\cdot}079.$

Dose.—1 to 2 drachms (**4 to 8 Cc.**).

Manufactured by decomposing fats with alkali or superheated steam.—P.J. i./06,316. ***Soluble*** in alcohol and water in all proportions, but immiscible with Ether or Chloroform.

Castor-Seed Ferment (Lipase) method of splitting up oils and fats is a satisfactory one for glycerin production. It is easy to conduct, but the Glycerin is very crude.—C.D. July 10/20,978.

The Germans when short of fat, increased production of Glycerin by yeast fermentation of sugar in alkaline medium in presence of Sodium Sulphite. Glycerin formed to extent of 36%. Americans produced it by fermenting molasses in presence of Sodium Carbonate.—B.M.J. i./22,115.

Glycerin distillation, historical, etc.—F. C. C. Robb, P.J. i./21,256.

Crystallisation of Glycerin occurs occasionally in the cold weather. It seems to have been first observed in 1866 and reported that year at the Paris Exhibition under Napoleon III. The melting point is 17° C.—C.D.

Uses.—Internally tends to relax the bowels. Is added to cough mixtures and to relieve forms of indigestion with gaseous distension. As an enema ½ ounce alone or with ½ water added relieves constipation, and it reduces piles. Externally 1 with 2 or 3 of water prevents cracks of chilblains and forms an ingredient in a large number of skin applications. It is a useful solvent for many active principles of drugs,

standing midway between alcohol and water, *cf.* **Glycetracta.** It is also a valuable preservative, *cf.* "Aqueous" Tinctures.

For burns stated to have been of much value as an application. Cotton wool to be soaked with it and covered with Oiled Silk.

As a throat pigment, and for uterine application, glycerin of tannic acid may be used double the official strength—1 in 2½ of Glycerin—**Pigmentum Acidi Tannici**, the *Off.* Glycerinum Acidi Tannici being 1 in 5.

WOUNDS have been treated by osmotic action by Glycerin in conjunction with ichthyol.—*See Wounds.*

Glycerinum Boracis (*Off.*) is not a mere solution; it has an acid reaction and when mixed with an alkaline carbonate evolves carbonic acid, *cf.* Vol. II.; useful, in infantile diarrhœa, in doses of 20 minims, repeated according to age.

Glycerinum Aluminis (*Off.* and 1898) is a useful astringent in chronic pharyngitis; is less disagreeable than tannin.

Gargarisma Aluminis.—U C.H. 2% in Acid Infusion of Roses; C.H.W. 5 grains with Tincture of Myrrh 40 minims to ounce.

Glycerin Jelly, for toilet use.

Gelatin 140 grains, Rose Water 6 ounces; soak a few minutes and heat in a water-bath to dissolve; add, when cool but still fluid, White of Egg ¾ ounce. Heat to coagulate completely, and add Glycerin 6 ounces, Salicylic Acid 12 grains. Mix well, filter through a hot-water funnel, and bottle while warm.

Lubricant Glycerin Jelly is supplied in '**Collapsubes.**' Is somewhat softer than the above; is also suitable for toilet use; intended for the lubrication of Stomach Tubes.

Glycerinum Aluminis et Acidi Tannici.

Potassium Alum (free from iron), in powder, 1, Glycerin 6. Heat to dissolve, and add Tannic Acid 1.

This is a very astringent throat pigment; has the advantages of a gargle without destroying the appetite. An ounce to a pint of tepid water forms a useful astringent vaginal injection.

Glycerinum cum Aqua Rosæ.

Glycerin 2, Rose Water 3 (prepared with Otto of Rose). Mix. An agreeable emollient for the skin.

℗ **Glycerinum Hydrargyri Perchloridi** contains ⅔ grain in 1 minim, *q.v.*

Glycero-alcohol. *Syn.* PETIT'S LIQUOR.

Dose.—5 to 60 minims (**0·3 to 4 Cc**).

Glycerin 333, Distilled Water 146, Alcohol 95% 580. Is used as a solvent of alkaloids and active principles, as it keeps indefinitely and does not evaporate. It has Sp. Gr. about 1.

Glyco-gelatin, T.H.

Refined Gelatin 1 ounce, Glycerin (by weight) 2½ ounces, Solution of Carmine *q.s.*, Orange Flower Water 2½ ounces. Soak the gelatin in the water two hours, then heat in a water-bath till dissolved, add the glycerin, and stir well together. When nearly cold add the carmine solution; mix till uniformly coloured.

Gelatinum Glycerinatum, U.S. Soak Gelatin 1 for one hour in sufficient previously boiled and cooled water to cover it. Drain and add Glycerin 1, heat until dissolved, strain hot, and evaporate to 2 by weight.

Glyco-Gelatin Pastilles (*Soft*). The following are prepared, each weighing 20 grains :—

Pastillus
- Acidi Borici .. gr. 2
- Acidi Carbolici .. gr. $\frac{1}{2}$
- Acidi Citrici .. gr. $\frac{1}{2}$
- Ol. Limonis .. m. $\frac{1}{4}$
- Ammonii Bromidi gr. 1
- Ⓟ Apomorphinæ .. gr. $\frac{1}{32}$
- Ⓟ Codeinæ .. .. gr. $\frac{1}{10}$
- Bismuthi Carb. .. gr. 3
- Ⓟ Bismuthi Carb.,T.H. gr. 3
- Ⓟ Morphinæ Acet. .. gr. $\frac{1}{40}$
- Cascara Sagrada .. gr. $2\frac{1}{2}$
- ℞℗1 Cocæ Extracti .. gr. $2\frac{1}{2}$
- ℞℗1 Cocainæ HCl. gr. $\frac{1}{6}$, $\frac{1}{8}$, $\frac{1}{10}$, $\frac{1}{12}$, $\frac{1}{20}$ (T.H. has $\frac{1}{10}$.)
- ℞℗1 Cocainæ . .. gr. $\frac{1}{15}$
- ℞℗1 Morphinæ .. gr. $\frac{1}{30}$
- Ⓟ Codeinæ .. .. gr. $\frac{1}{8}$
- Convallariæ Tinct . m. 2
- Eucalypti Olei .. m. $\frac{1}{2}$

Pastillus
- ℞℗1 Eucalypti Olei. m. $\frac{1}{2}$
- ℞℗1 Cocainæ HCl... gr. $\frac{1}{20}$
- ℞℗1 Heroin .. .. gr. $\frac{1}{24}$
- Menthol, T.H. .. (St. Th. H. gr. $\frac{1}{4}$) gr. $\frac{1}{6}$
- ℞℗1 Menthol. .. gr. $\frac{1}{20}$
- ℞℗1 Cocainæ HCl... gr. $\frac{1}{20}$
- Ⓟ Menthol .. .. gr. $\frac{1}{20}$
- Ⓟ Codeinæ .. .. gr. $\frac{1}{10}$
- Menthol .. .. gr. $\frac{1}{20}$
- Eucalypti Olei .. m. $\frac{1}{2}$
- Ⓟ Morphinæ Acet.... gr. $\frac{1}{30}$
- Ⓟ Pini Pumil. Olei... m. $\frac{1}{2}$
- Ⓟ Terpeni Hydratis . gr. $\frac{1}{8}$
- Ⓟ Heroin HCl. .. gr. $\frac{1}{60}$
- Sulphur Præcip .. gr. 5
- Potassii Tart.Acid. gr. 1
- Terebeni .. .. m. 2
- Thymol .. .. gr. $\frac{1}{32}$
- ℞℗1 Tussis=Cocainæ.. gr. $\frac{1}{15}$
- et Morphinæ .. gr. $\frac{1}{30}$

The **Pastils** or **Jujubes** commonly sold of oval or round shape (frequently 'sugared') will be found in the index under Trochisci marked '**G.**' (*i.e.*, of Gum).

Marshmallow Pastils, PASTILLES DE GUIMAUVE

Boil incised Marsh Mallow Root 100 in Water 400, strain off the liquor. Evaporate to about 80 and mix with Tragacanth 10 and Sugar 1,000, adding Orange Flower Water 10 or more if necessary to make a mass for cutting into Pastils weighing 20 grains (1·2 Gm.). This basis may be medicated with throat remedies similar to those given under Glyco-gelatin Pastils.

Suppositoria Glycerini (*Off.*). Gelatin 14, Glycerin by weight 70, Water *q.s.* to 100, suitably combined. Pour into moulds of 15, 30, 60, or 120 minims or other capacities as required. Contain 70% by weight of Glycerin. This basis may be used for gelatin **pessaries.**

U.S. orders Glycerin 30, Monohydrated Sodium Carbonate 0·5, Stearic Acid 2, Water 5, in Gm. for 10.

Vaginal Suppositories, U.S., are globular or oviform in shape and weigh about 10 Gm. if made with Glycerinated Gelatin, and 4 Gm. if with Theobroma Oil, *v.* also **Ovules.**

Glycerin Tampons consist of gauze and wool swabs soaked in Glycerin medicated with Ichthyol 5 and 10%, also Resorcin 1 and 2%.

Hollow Suppositories, composed of Oil of Theobroma. May be filled with 20, 45, or 90 grains of Glycerin ; they are prompt in action.

Hollow Suppositories and **Pessaries** may also be filled with **Bismuth** and **Cocaine Ointment, Gall** and **Opium Ointment, Liquid Extract** of **Hamamelis, Hamamelis Ointment, Suprarenal Extract, Adrenalin Solution.**

Cataplasma Kaolini, U.S. VIII.—Kaolin 577, Boric Acid 45, Thymol 0·5, Methyl Salicylate 2, Peppermint Oil 0·5, Glycerin 375 (all by weight). Heat the Kaolin one hour on a water bath, add boric acid, glycerin, etc. L. H. has this with 50 less Kaolin and 50 more Glycerin.

Cataplasma Salicylicum Compositum, ✱ **Antiphlogistine,** (T.M. 253831). ✱ **Sorbefacin,** (T. M. 303921), and **Thermofuge** are useful to remove œdema, to relieve pain and swelling of local inflammations.

Glycerin Substitutes. (Used during the war.)
No. 1.—*For external use* (for viscous effect.)
Tragacanth 225 grains, alcohol 90% 2 ounces, Lavender Oil 30 minims, water to 2½ pints, *misce s.a.*
No. 2.—*For internal use* (sweetening and demulcent effect).
Mix Liquid Glucose 1 part with 3 parts of the above.
For further details see last Edn. p. 430.

GLYCETRACTA (GLYCETRACTS).

Strength.—1=1 of Drug.

Dose.—The equivalent in volume to the dose of the drug, excepting those standardised. *v.* p. 444. For complete list of doses see Index.

Glycerin is well known to be a good all-round solvent and preservative for medicinal substances. As Marshall remarks, "Substances which are soluble in water and insoluble in alcohol are to some extent soluble in glycerin." It should be noted that, as a general rule, glycerin extracts must contain at least 25% of glycerin to preserve them.

"Glycetracts" in general, first described by us, C.D. i./08,489, have the advantage of miscibility and compatibility with aqueous vehicles, with exceptions (those of alkaloidal drugs made with a necessary small addition of acid would be incompatible with alkalis). Many of them are suitable both for internal and local use; they keep well, are cheap, and being free from alcohol, are convenient and suitable for export.

The following glycetracts are perfectly miscible with water forming a clear solution:—

P1 Glycetract of belladonna.
Glycetract of calumba.
Glycetract of cascara.
Glycetract of chiretta.
P Glycetract of conium
P Glycetract of digitalis.
P Glycetract of gelsemium
Glycetract of gentian.
Glycetract of hamamelis
P Glycetract of hyoscyamus.
P Glycetract of jaborandi (almost).
Glycetract of quassia.
Glycetract of sarsaparilla.
Glycetract of squill.
Glycetract of senega.
Glycetract of senna.
Glycetract of taraxacum.
Glycetract of valerian.

The following do not form perfectly clear solutions with water, but can be rendered miscible, as stated later:—

1 Glycetract of aconite.
Glycetract of catechu.
Glycetract of cinchona.
P1 Glycetract of coca.
P Glycetract of colchicum.
P1 Glycetract of ergot.
P Glycetract of hydrastis.
Glycetract of krameria.
Glycetract of rhubarb.
P Glycetract of Virginian prune.

METHOD OF PREPARATION.

1. For Drugs containing water - soluble constituents, bitters, tannin principles, and some flavouring agents :—

(*a*) *Percolation-process.*—For those drugs which will percolate satisfactorily without "blocking" this method is to be preferred. Macerate 100 of the drug in No. 20 powder in glycerin 50 and water 200 for twenty-four hours, then commence percolation. Reserve the first 50 of percolate and continue percolation with chloroform-water (1 in 1,000) until exhausted, Evaporate the liquor to 50 and add to the reserved portion.

Experiments show that this percolation method is suitable for calumba, cascara (1% of strong solution of ammonia to be added), digitalis, gentian, hamamelis leaves, krameria, rhubarb, sarsaparilla, senega, taraxacum, valerian and Virginian prune bark. Glycetract of Virginian prune is made without heat.

(*b*) *Maceration-process—i.e.*, for drugs which will not percolate satisfactorily. Macerate crushed drug 100 in a hot mixture of glycerin 50 and water 200 for six hours, press off, and repeat maceration with hot water twice. Combine liquors and evaporate to 100.

Experiments show that this is suitable for chiretta, liquorice (cold maceration), quassia, senna (cold maceration), squills (cold maceration).

Glycetract Digitalis (1=1).

Dose.—1 to 2 minims (**0·06 to 0·12 Cc.**). Wash the powdered leaves 100 thoroughly with Petroleum Ether and dry, then make an extract, strength 1 in 1, from this washed leaf using Glycerin 20 and Absolute Alcohol *q.s.*, to 100. Reserve the first 75 and percolate to exhaustion with Absolute Alcohol, add the extractive to the reserve and make up to 100 by volume with the Alcohol. This method improves the Digitoxin content of the preparation and retains also the other constituents. The preparation is fully eight times as active as a strong Digitalis Tincture.

2. Alkaloidal Drugs.

For drugs containing alkaloids we recommend to percolate, wherever possible, crushed drug 100, with a mixture of glycerin 50, acetic acid 9, and water 191, and proceed otherwise as under 1 (*a*), making the final product 100 containing about 3 per cent. of acetic acid.

This method our experiments show to be applicable for aconite, belladonna, cinchona, colchicum, conium, ergot, gelsemium, hydrastis hyoscyamus, ipecacuanha and jaborandi. A larger proportion of acid does not yield larger alkaloidal contents.

The acetic glycerin mixture extracts the bulk of the alkaloids in most cases. The marcs left over, after being pressed dry, were percolated with alcohol and found to be, practically speaking, exhausted, with one or two exceptions. Hydrochloric acid might yield better figures, but there are some objections to its use. (Beringer uses Tartaric Acid—2% in the finished product except for Colchicum, Conium and Ipecacuanha in which Acetic Acid is used.)

"Glycetracts" of those drugs which do not form *clear liquids* with water can, if preferred perfectly miscible, be replaced by an aqueous extractive, evaporating and mixing a sufficiency of glycerin with the warm liquor. Alkaloidal drugs should, however, be handled by the method given under No. 2, and the fact of these forming opalescent mixtures with water cannot well be obviated.

The following **Glycetracta** are standardised :—

Glycetract.	Alkaloidal Strength.	Dose.
[P1] Aconite	0·4 % Alkaloids.	(Average) 1 min
[P1] Belladonna	0·375 ,,	1 to 2 min.
Cinchona	3·0 ,,	8 to 25 min
[D] [P1] Coca	0·25 ,,	1 to 2 dr.
(P) Colchicum (seeds) ..	0·5 ,,	(Average) 3 min.
(P) Conium (seeds)	0·45 ,,	(Average) 3 min.
(P) Digitalis	M.L.D.0·1Cc.per 100 Gm. frog.	1 to 2 minims.
(P) Hyoscyamus	0·075% Alkaloids.	(Average) 3 min.
(P) Ipecacuanha	1·1 ,,	Expectorant 1 to 4 min Emetic 30 to 40 min.
[P1] *Nux vomica	0·75% Strychnine.	2 to 6 min.

For **Sanguinaria**, Acetic Acid is unsatisfactory, 10% of Hydrochloric Acid is, however, useful.

Fluidglycerate of Buchu is made with Buchu 100 Gm., Potash Solution 50 Cc., Glycerin 50 Cc., Water 100 Cc.

Fluidglycerate of Grindelia is made alkaline on the lines of that of Buchu. See also Beringer who has worked on similar lines. —Am. J l. Ph. 1907,410 ; 1908,525 , 1909,312.

Glycopasta is the name given to a Glycetract (*neutralised if necessary*), made into a paste for local use by mixing with Tragacanth 2 to 3%, *e.g.*, the following :—

[P1] **Glycopasta Belladonnæ** 0·375% Alkaloids. (Glycerinum Belladonnæ *q.v.* is about 0·5% Alkaloids.) [P1] **Glycopasta Aconiti** is the Glycetract alone (no thickening necessary). (P) **Glycopasta Hyoscyami** 0·075% Alkaloids. If considered too strong they should be directed to be diluted with Glycerin.

*GLYL AND *SYL FLAVORING AGENTS (*Martindale*)

The Official flavoring *Waters, Infusions, Spirits, Syrups,* and *Tinctures* are largely used, but in these there is room for improvements in many particulars.

Our suggestion is to employ as flavoring agents to prescribed "mixtures" Solutions in either Glycerin or Syrup of those Essential Oils which are pleasant to the taste. These preparations are called respectively ***Glyl** and ***Syl**† throughout our pages.

'Glyl' and 'Syl' Flavoring Agents are stable within ordinary limits of temperature. Their use tends to uniformity and time saving, both in prescribing and in dispensing.

*This Glycetract is best made with Hydrochloric Acid—the strength employed is 5 Cc. of Hydrochloric Acid Sp. gr. 1·16 to 100 Gm. of drug.

†These two words are Registered Trade Marks—the property of the authors. We permit *Pharmacists to make the preparations in question for the flavoring of prescribed medicines.* The strength and method of preparation to be strictly adhered to as described.

In all other respects the use of the Trade Marks is reserved by the owners, Trade Marks in other portions of the book must be carefully observed.

The preparation of the Distilled Waters hitherto employed, entails unnecessary labour, more especially as several, *e.g.* Cinnamon, Orange Flower, Rose, have poor keeping qualities. Then again, many of the Aromatic Waters require the addition of either Glycerin or Syrup to render them of use in covering the taste of nauseous medicines. The same applies to Tinctures and Spirits.

Fresh infusions of drugs are useful for flavoring, but the fact seems to be ignored that, though the infusions are '*fresh*,' the drugs in many instances are *dried*, and *ergo* may have lost much of their aroma.

Of the usual flavoring tinctures in our opinion that of Orange is the only one of sufficient power to 'cover' the taste of a nauseous drug, but alone it is of little avail—a sweetening agent in addition is essential. Syrup of Orange by reason of its utility has become hackneyed.

Glyl *and* **Syl** *flavorings have now been well tried and are much prescribed.*

Preparation.—

Glyl and Syl flavorings are all of uniform strength—1 of the Essential Oil in 500 respectively of Glycerin or Syrup—or approximately 1 minim to the ounce, and are quickly prepared by placing half the required amount of Glycerin (slightly warmed, *e.g.*, by standing the bottle in a little hot water) or Syrup in a bottle capable of holding the full amount, adding the required amount of Essential Oil mixed with three times its volume of 90% Alcohol in small portions with continuous shaking, then adding the remainder of the Glycerin or Syrup with further vigorous shaking.

Thus made (it is intended the pharmacist should prepare a stock ready for use) and allowed to stand a short time for the small excess of Essential Oil to rise (the excess is easily removed by passing through a pledget of moist Cotton Wool or by the use of a separating funnel), it will be found that all the following are perfectly clear, and remain so for a long period, with exception perhaps of Syl Anisi (Glyl Anisi is clear), Syl and Glyl Sassafras, and Syl Pimentæ. Indeed the solubility of these Oils in Glycerin is remarkable.

Glyl vel **Syl*** Amygdalæ Amaræ *sine* HCN.
,, ,, Anethi.
,, ,, Anisi.
,, ,, Aurantii Amari.
,, ,, Aurantii Floris.
,, ,, Carui.
,, ,, Caryophylli.
,, ,, Cinnamomi.
,, ,, *Coriandri
,, ,, Fœniculi.
,, ,, *Lavandulæ.
Glyl vel **Syl** Limonis.
,, ,, *Menthæ Piperitæ.
,, ,, ,, Viridis.
,, ,, Myristicæ.
,, ,, Pimentæ.
,, ,, Pini Pumilionis
,, ,, *Rosæ.
,, ,, Sassafras.
,, ,, Thymi.
,, ,, *Vanillæ (1 of Essence *q.v.* in 8).

The favorites in the series according to our taste are indicated by*.

Glyl Aurantii Amari, Cinnamomi, Pini (excellent for Terebinthinous drugs), and Thymi are also good,

Glyl Pini and Syl Lavandulæ together is a useful combination.

Dose.—Of either Glyl or Syl, to flavor an ounce dose of a mixture, 1 to 2 drachms, as a general rule, suffices. In the case of Glyl or Syl Menthæ Piperitæ ½ drachm will be ample.

Where sugar in any form is to be avoided preference will naturally be given to the Glyls.

Occasionally a fresh infusion of a drug, *e.g.*, a vegetable bitter is required. In such cases the addition of a Glyl or Syl, if used in bold dose, will act both as preservative and flavoring agent,—both Essential Oils and Glycerin are antiseptics.

E. O. Rowland has suggested Glycerins of Lemon and Orange Peel made from fresh peel.—C.D i./14,594

GOSSYPIUM.—*Syn.* Cotton Wool.

The hairs of the seeds of *Gossypium Barbadense* and of other species of gossypium, freed from fatty matter, employed as a wound dressing.

Manufacture of Cotton.—The bleaching solution may be made by dissolving 5 cwt. of 35% Chlorinated Lime in 600 gallons of water and allowing it to settle. One gallon of this solution with twenty gallons of water is considered strong enough for use. The bleaching solution is allowed to act for several hours. After removing the bleach liquor the cotton is soured and washed to get rid of lime and chlorine. The acids used for souring may be either sulphuric or hydrochloric. For washing, the softest water is used. After washing the cotton is soaped and again washed and the cotton finally treated with a little Tartaric Acid. This imparts crispness—a characteristic in demand but of no real value. For details of machinery required see A. W. Gerrard, P.J. i./16,573.

Cotton Wool is soluble in an ammoniacal solution of copper oxide.

The following surgical forms of **Cotton Wool (and Allied Dressings)** are in use. *See also* under the individual antiseptics for medicated preparations.

Bandages.

Black Cloth, 6 yards, 1½, 2, 2½, and 3 inches are prepared for use as slings.
Buttercloth, 1, 1½, 2, 2½, 3, 4, and 6 inches (6 yards).
Calico, 1, 2, 2½, 3, 4, and 6 inches (6 yards).
"Cataract" (of special form for bandaging after operation for).
Crepe, Geneva, 1½, 2, 2½, and 3 inches wide and 8 inch binders.
,, Velpeau, 2, 2½, and 3½ inches wide.
Crinoline, for silicating and Plaster of Paris, 1, 2, 3 and 4 inches wide.
Domette, 2, 2½, 3, 4, 5, and 6 inches wide.
Elastic Circular Stocking, 2½, 3, and 4 inches (any length).
Elastic, India Rubber Webbing, 1, 2, and 3 inches wide.
Flannel, 2½, 3, 4, and 5 inches wide.
Gauze, Plain, Absorbent, 4 inches wide.
"Ideal" (a special elastic bandage) 2½ and 3 inches wide.
Muslin, Check, for Plaster of Paris, 2, 3, and 6 inches wide.
Open Wove, white absorbent, 1, 1½, 2, 2½, 3, 4, 5, and 6 inches wide.
Plaster of Paris, 2, 2½, and 3 inches wide. In air-tight containers.
Selvedge, white and grey, 2, 2½, 3, and 3½ inches wide.
Stockinette.—See Elastic Circular Stocking above.
Triangular Splint.

Battist, Milne's. A substitute for oiled silk, guttapercha tissue, and jaconet. Can be boiled, and is spirit and greaseproof.

Billroth's Cambric—Consists of cotton fabric treated by a special process. It takes the place of Gutta Percha Tissue and Oiled Silk, being capable of sterilisation.

Buttercloth.—As a dressing for applying ointments, liniments, &c. Width 36 inches.

Cellulose Film in three varieties.—

'Taffetas.'—A yellow film similar in texture to Yellow Oiled Silk and suggested as a substitute for same. It is perfectly *greaseproof* but swells slightly in contact with moisture, hence though suitable for use with Soft Paraffin basis ointments is not intended for applying dressings containing aqueous medicaments. It is nevertheless sterilisable by moist heat.

'Aseptafilm.'—This modification is colourless and being transparent and sterilisable may be applied direct to wounds.

'Cellafine.'—This variety is the thinnest and is used as a greaseproof covering for packing pharmaceutical and food products to preserve same for export to hot climates.

All the above are unaffected by Alcohol and Ether, but they expand in contact with moisture—contracting again on cooling—in some cases this property is of distinct value.

Cellulose Wadding.—A cheap absorbent dressing. Is prepared from wood fibre. **Cellulose Wadding** is in sheet form.

Eye Pads are ready cut, round or oval, consisting of a layer of wool between two sheets of gauze.

Felt, thick, coated with adhesive solution, in sheets 28 inches by 18 inches and with soap plaster for bed sores.

Gauze Tissue, see Gauze and Wool Tissue.

Gauze, White Absorbent, is prepared in 6 yard pieces. Tela Depurata, P.G. is similar.

The meshes of gauzes should be small and regular.—*cf.* Iodoform gauze.—G. Lenthal Cheatle, L. i./13,1763.

Gauze and Wool Tissue, plain and medicated with Boric Acid, Carbolic Acid, Iodoform, Ⓟ Mercuric Iodide, [P] Mercuro-Zinc Cyanide, Thymol, Picric Acid, are prepared.

Gauzes, Ribbon, as suggested by C. Stonham, have a woven edge and are used for plugging cavities and wounds.

The following are made in ¼ inch, ½ inch, 1 inch, 2 inch widths, in 12 yard lengths :—

Alembroth, Aluminium Acetate, Boric Acid, Carbolic Acid, Iodoform, [P] Mercuro-Zinc Cyanide, Ⓟ Mercuric Perchloride, also Non-Medicated.

Gauze Tampons, 3 inches long and ⅜ to 1 inch in diameter (with thread attached), coated with soft soap, useful in obstinate constipation. Evacuation occurs in ¼ hour.

Handkerchiefs, Aseptic (Silky Fibre), are medicated with Eucalyptus and Pine Oil, and Non-Medicated in wallets.—Intended for phthisical sufferers.

Impermeable Piline.—⅓ the thickness of spongio-piline of felt, and instead of the waterproof indiarubber backing of the former, there is an antiseptic material, not affected by heat or strong spirit. Suitable for applying liniments in rheumatism, and where warmth is desired simultaneously.

Jute, in 1 lb. rolls for rough absorbent purposes.

Kapok Wool strongly advised as wound dressing. Useful absorbent of discharges.—B.M.J. i./18, 276.

Sheep's Wool. *Syn.* THERMO-LAINE. Antiseptic for tampons. As a treatment for prolapse of the uterus; applied every day by the patient. Does not absorb fluids and maintains size and gives support. May be impregnated with mercuric biniodide 1 in 10,000.

Has many advantages over Cotton Wool, *e.g.*, in the use of a gamgee jacket. Cotton prevents the escape of moisture. In prolonged operative work the long anæsthesia lowers bodily temperature, it is important to take every precaution to conserve the heat of the mutilated patient. When the lowering effects of the anæsthetic and the operation cause cold clammy perspiration to exude, gamgee tissue retains it and becomes of the nature of a refrigerator; here a wrap of sheep's wool would be preferable. Other uses, *e.g.*, rheumatism, pulmonary affections suggest themselves.

Sheep's wool not only kills fleas but has no attraction at all for them.—P. Delanoe, per Jl. Trop. Med., July 2/23,327.

Lint (*vide also* Steriloid Dressings), absorbent, is made both non-medicated and medicated :—Boric, 50% coloured pink. Iodoform, 10%. Non-Absorbent useful for local use. Styptic (10% Ferric Perchloride).

Linteum Carptum L.H. is plain absorbent lint.

Muslin, Nainsook, width 36 inches. Somewhat softer than buttercloth. Is useful for ointments.

✱**Pontampons** (T.M. 307382) consist of a semi-solid slowly soluble medicated cone with a non-absorbent wool tampon attached—the whole encased in a gelatin shell. On introduction into the vagina the gelatin shell

disintegrates; the compressed wool tampon expands, carrying the medicated cone upward against the cervix, where it slowly dissolves, thus affording a continuous application to the inflamed and congested mucous membrane of the vaginal tract

By mechanical expansion not only are the vaginal folds distended, thus assuring complete medication, but the Tampon raises and supports the uterus, thus relieving the venous congestion, thereby correcting displacements.

For the treatment of gonorrhœa, endometritis, cervicitis, vaginitis leucorrhœa, dysmenorrhœa, prolapsus uteri.

The following Medications are made —

(A). Ⓟ Ichthyol Compound—*i.e*, Ichthyol 2·5%, Iodine 0·14%, Carbolic Acid 0·5%, Powdered Hydrastis 1%.

(B). Ichthyol 10%.

(C). Protargol and Ichthyol, each 2%

(D). Ⓟ Opium and Hyoscyamus of each 2 grains, Belladonna 1 grain. All the above are made with a Boroglyceride basis.

Sanitary Towels, Hygienic, for menstruation, of Sphagnum (*q.v.*) are absorptive, deodorant and antiputrescent. Southall's, Nos. 0, 1, 2, 3, 4 and extra large, and the "Mene" are of cotton fabric. Maw's are in two brands, 'ordinary' and 'superfine.'

Sponges, Carbolised, are used in abdominal surgery, they have fallen into disuse but some surgeons still prefer them to cotton swabs.—

(1) About 2 to 3 inches in diameter.
(2) About the size of palm of hand.
(3) Large flat, about 8 inches in diameter.

Sir W. Watson Cheyne says it is not necessary to discard these useful articles because they are spoilt by boiling. If immersed in suitable solutions for correct time (*e.g.*, 1 in 20 Carbolic for 1 week), they will be thoroughly sterilised. Much more suitable than gauze swabs for soaking up blood

Marine Sponges, Catgut and many useful materials have been abandoned on account of the supposed difficulties in disinfecting them—the idea being that nothing but heat is a trustworthy disinfecting agent. The operating theatre and arrangements are apt to assume undue importance. There is a great deal more in the treatment of wounds than simple cleanliness and the avoidance of irritation.

Sponge Eduction.—In the treatment of cases of laceration of the finger in which a bare and protruding bone or extensive stripping of the skin with denudation of the deeper parts may render amputation necessary. The method makes it possible in most cases to save the full length of the stump. Flat Turkey Sponge is used, soaked in 1 in 40 Carbolic Solution before the operation. For details of methods *vide* L. ii./11,1348

Circular Gauze and **Wool** pads, about 3 inches in diameter. Also sterilised (*vide* Steriloid Dressings).

Spongio-Piline.—Thick felt with waterproof india-rubber backing for applying warm moist dressings.

Tillman's Dressing is Cellulose Wadding *q.v.*

Tow, Flax, *cf.* **Tenax.**

Wool, Absorbent Cotton (also non-absorbent).

Both the above also in thin sheets measuring 20 by 14 inches.

✱ "Steriloid" Dressings. (T.M. 260647).

These dressings have been submitted to a temperature of 250° F. for 30 minutes at a pressure of 15 lbs. in an autoclave. Each parcel of dressing is wrapped by a patent method in wool, parchment wrapper, and enclosed in an air-tight dustproof carton or hermetically sealed tin.

Bandages (in tins), 2, 2½, 3, and 4 inch.

Gauze, plain, absorbent, 1, 2, 6, and 12 yard cartons.
,, **Alembroth** and **Boric,** each 1 and 2 yards.
[P1] ,, **Cyanide,** 1, 2, 6, and 12 yard cartons.
Ⓟ ,, **Biniodide,** 6 yards.

Lint, plain, absorbent, **Alembroth, Boric,** and [P1] **Cyanide,** each in cartons.

Wool, plain, absorbent, 1, 2, and 8 oz. cartons.
,, **Alembroth, Boric,** and [P1] **Cyanide,** each in 1 and 2 oz. cartons.

[P1] **Swabs, Cyanide.** Gauze, 4 × 4 inches, 12 in carton.

In addition, **Iodoform Gauze** (2 yards) and **Carbolised Wool,** 50, 100, and 250 Gm. are wrapped with aseptic precautions in similar cartons, but are not heated.

Combined cartons contain 1 ounce of plain absorbent wool, with ½ yard plain absorbent gauze sufficient for a minor dressing, and combined cartons containing Alembroth Gauze (6 yards) with wool and gauze tissue suitable for a major operation.

Swabs, cartons contain: 12 small round pads suitable for eye-work; 6 larger round pads (about 2 inches in diameter); 12 gauze, 6 inches square; 12 wool and gauze tissue pads, 3 inches square; **tins** contain 10 gauze covered swabs, 4 inches square; also **tins** containing 10 swabs 6 inches square (*vide* also Triangular Swabs).

[P1] **Swabs, Cyanide,** 12 in carton, 4 inches square.

Triangular Swabs have a pocket at one angle in which the finger or a probe can be introduced. For packing a cavity or wound during operation. In tins of 10 and 20 swabs. By counting the swabs left over the surgeon can be certain of not having left any in the wound.—Jackson Clarke.

Eye Pads, 1 doz. in carton.

Towels (Tins of 4), 18 × 32 inch.

Wrappers 6 feet long with slit in same, 10 × 2 inches, for abdominal operations, also 3½ feet long.

Abdominal Set in flat tin with key, contains 12 swabs 6 × 8 with tapes, 12 swabs 6 × 6, with tapes, 4 towels, 32 × 18 inches, 2 thick pads 6½ × 8½ inches (as dressing), with 6 safety pins, 1 bandage 4 inch × 6 yards, 2 wrappers with sleeves, twelve 4 inch × 3 yard gauze rolls, 2 veils for covering operator's and assistant's faces.

The Swabs have attached to them tapes which are left hanging outside any cavity into which the swab is passed—pressure forceps applied to the free end of the tape to prevent the possibility of the swab being left in the cavity.—J. Jackson Clarke, Medical Press, Sept. 24/1913.

Eye Operation Set, No. 1, tin containing 3 Sterile Sets of the following:—12 small eye swabs, 1 special eye pad, 1 × 2½ inch bandage. (A set can be removed without impairing the others in any way.)

Eye Operation Set, No. 2, containing 1 × 2 inch bandage 4 eye pads, 4 pieces gauze, 1 oz. wool.

Preparation of Medicated Sterilised Dressings.

The following notes are intended to assist the pharmacist in preparing at short notice his own Sterilised Gauzes, Wools, etc. They are based on a paper by Beringer.—Am. Jl. Ph., Apl. 1911 (see Reprint in P.J. i./11,619) and some experience of our own in this class of work.

It has been necessary to add to Beringer's formulæ several for Gauzes largely used in the British Empire and to omit some which are not in demand with us.

Specially cleansed rooms are of course required for work of this kind. All tables, floors, etc., should be scrupulously scrubbed with soap and Cresylic Disinfectant. The tables just prior to use should be washed down with 1 in 500 Perchloride Solution and then may well be covered with sheets of freshly sterilised parchment paper. Operators' hands, clothing, etc., require usual attention. Cartons, tins, wrapping paper, etc., should be heated in an oven at 120–150° C. for half an hour.

Absorbent Gauze.

The gauze suitable for use contains about 12 threads to the Cm., both on the wool and on the warp and is about 1 yard wide. This is wrapped and sterilised in convenient lengths for surgeons' use.

Moist Absorbent Gauze.

Sprinkle the Sterile gauze with Sterilised Distilled water containing 5% Glycerin and pack in previously sterilised amber glass jars and sterilise again.

Boric Acid Gauze, 20% (Usually colored pink.)

Impregnate Gauze 100 with boiling Saturated Solution of Boric Acid tinted with magenta. Press out until it weighs 180 and dry.

Carbolised Gauze, 5%.

For this employ Phenol 5, Acetone 50, Water 50, Glycerin 5, to Gauze 100 as under Iodoform Gauze. (Dry).

Iodoform Gauze, 10% (Dry).
Dissolve Iodoform 10 in Acetone 100, saturate Sterile Gauze 100 with the solution, evaporate the Acetone.

Iodoform Gauze, 10% (Moist).
Proceed as for Iodoform Gauze (dry) incorporating about 1% Glycerin in the Acetone solution.

Ⓟ **Mercuric Iodide Gauze 4%.**
Impregnate Gauze 400 under pressure with a solution of Mercuric Iodide 1 and Potassium Iodide 1, in Water 800. Less Liquid, *e.g.*, Water 400 will work equally well by adjusting the pressure. We have also employed for this quantity a mixture of Acetone 200 and Water 200.

[P] **Mercuro Zinc Cyanide Gauze 3%.**
Prepare a suspension of Mercuro-Zinc Cyanide 3 in Sterile Distilled Water 600 tinted with rosaniline and mix evenly by stirring or shaking with Gauze 100. Dry without pressing.
In the manufacture of this Gauze note that much more water is required than usually advised.

Picric Acid Gauze 2%.
Picric Acid 2, Water and Acetone of each 50, Gauze 100.
Proceed as under Dry Iodoform Gauze.

Sal Alembroth Gauze 1%.
Impregnate Gauze 100 under pressure with a solution of Sal Alembroth 1 in Water 200 tinted with Anilin Blue. Less water may be used or a mixture of Acetone and Water, *e.g.*, Acetone 50 and Water 50.

Thymol Iodide Gauze 5%.
Dissolve Thymol Iodide 5 in Chloroform 25 and add Acetone 50. This quantity is suitable for 100 Gm. of Gauze.
All Gauzes should be sterilised at 120° to 150° C. for half an hour just before medicating.
If a steriliser be available—*cf.* Chapter on Sterilisation, a less temperature *e.g.*, 120° C. will be sufficient, furthermore the use of a vacuum apparatus will permit of excess of moisture being drawn off rapidly.
The preparation of **Wools**, and **Gauze and Wool Tissues** is on similar lines. We give brief notes of procedure under respective headings, *e.g.*, **Gossypium Carbolisatum, Gossypium Ferri Perchloridi, Gossypium Sal Alembroth, etc.**
National Health Insurance requires the dressing to be issued to the patient wrapped in dust-proof casing.

Dental Dressings.

For Dental use are prepared —
Aseptic Dental Napkins to be used once and thrown away.
Absorbent **Dental Rolls.** As a substitute for the napkin or rubber dam. For covering the mouths of the salivary ducts, a section may be placed on either side of a tooth, or the entire roll may be bent round the outside of the arch or under the tongue. No. 1, diameter $\frac{5}{16}$ inch; No. 2, $\frac{3}{8}$ inch; No. 3, $\frac{1}{2}$ inch; No 4, $\frac{5}{8}$ inch; in $1\frac{1}{2}$ or 6 inch lengths.
Non-absorbent **Dental Rolls**—To replace the rubber dam. In crown and bridge work. May be used in connection with the saliva ejector
Sterilised Absorbent **Pledgets** for wiping out cavities.
Aseptic Absorbent Points are prepared for drying pulp canals.
Sterilised Bibulous Paper, in sheets, 3 inches by 10 inches.
Carbonised Cotton for filling pulp canals, and for treatment of exposed pulps.

Cellulose Acetate is used for treating the fabric of the planes of aeroplanes. It is water resisting and renders the planes taut. The acetate acts as a preservative. It is combustible but not explosive.—C. F. Cross C.D. i./17,252.
DOPE.—The name given to a solution of Cellulose Acetate or Celluloid in Tetrachlorethane with Amyl Alcohol and Benzene. Cases of poisoning from inhalation of fumes of.—See W. H. Willcox, L. i./15,544, also W. E. Lee, L. i./16, 24.
Viscose.—When Carbon Bisulphide is added to Caustic Soda and wood pulp a chemical combination takes place. The substance swells and becomes water-soluble. This is the foundation of viscose used for capping bottles. The plastic mass spontaneously reverts to cellulose.—C. F. Cross, C.D. i./17,252.

This and **Artificial Silk** are made of Cellulose under Cross, Bevan and Beadle's Patent 8700/92. The patent was prolonged for five years.—S. W. Woolley. 'Enemy Patents and Trade Marks,' Oct. 24/18.

Gossypii Radicis Cortex.

The root bark from *Gossypium herbaceum* (*Malvaceæ*) and other cultivated species is *Off.* It contains about 10% acid resin.

Uses.—The following are given instead of Ergot to check uterine hæmorrhage in all its forms. May relieve dysmenorrhœa.

Chemical Examination of the bark.—F. B. Power, P.J. ii./14,420

Extractum Gossypii Radicis Corticis.—Semi-alcoholic.

Dose.—1 to 4 grains (**0·06 to 0·25 Gm.**) in pill.

℞ **Pilula Gossypii Composita.**

Extract of Cotton Root, Extract of Hydrastis, Ergotin, of each 1 grain. *Dose.*—One, 3 or 4 times a day.

Extractum Gossypii Radicis Corticis Liquidum, *Off.*

Dose.—½ to 1 drachm. The bark exhausted with a mixture of Glycerin 1, Alcohol (90%) 3; 1=1.

Flavoring.—Syl Lavandulæ, Glyl or Syl Cinnamomi.

Extractum Gossypii Seminis Pulverisatum.

Powdered Cotton Seed Extract. *Syn.*—✱Lactagol (T.M. 252851). *Dose.*—1 teaspoonful 4 or 5 times daily given in milk.

Said to increase the flow of milk and the nitrogenous constituents of same. According to the *Lancet* analysis it appears to consist practically entirely of protein substance, the total Nitrogen amounting to 15·68%.—L. ii./12,702.

Edestine. Stated to be the active principle, so far as galactogogue action is concerned, of cotton seed freed from fat, etc.—L. i./12,830.

Effect of *Edestine* on mammary secretion. Rat experiments. It is a good protein sparer and improves growth but in large proportion (*e.g.* 46%) the young die.—G. A. Hartwell, L. i./22,323.

Edestine is also obtainable from *Linseed* by precipitation with water from a 4% Saline Extractive. *Vide* also Vol. II. Peptic Index.

Tinctura Gossypii Radicis.

Dried bark of Root of Cotton Plant 1, Alcohol 60% 4.

Dose.—1 drachm (**4 Cc.**) three times a day.

GRINDELIA *Off.*, U.S.
Gum Plant.

The dried leaves and flowering tops of *Grindelia Camporum* are *Off.* The involucre, and often the leaves, are coated with a glutinous oleo-resin. The medicinal action is due to resins.

Uses.—For the spasmodic attacks which occur in asthma, whooping-cough, and bronchitis, and given in heart disease to slow and regulate the pulse.

Extractum Grindeliæ (by alcohol extraction).

Dose.—2 to 3 grains (**0·12 to 0·2 Gm.**) in a pill with lycopodium three times a day.

Extractum Grindeliæ Liquidum, (*Off.*)

Exhaust herb with alcohol (90%), distil, add Sodium Bicarbonate to residue and water *q.s.* with alcohol (90%) one-fourth to make 1=1.

Dose.—10 to 20 minims (**0·6 to 1·2 Cc.**) at the onset of a paroxysm of asthma, repeated every half-hour or hour, in sweetened water or milk. Useful for whooping-cough.

Flavoring.—Syl Pini (very good), Syl Lavandulæ.

Spiritus Grindeliæ Compositus.

Dose.—1 to 2 drachms **(4 to 8 Cc.)** in water every two to four hours while attack of asthma lasts.

Liquid Extract of Grindelia 15 minims, Sodium Iodide 2 grains, Nitroglycerin Solution ½ minim, Tincture of Euphorbia Pilulifera 20 minims, Spirit of Chloroform to 1 drachm.

Extractum Grindeliæ Compositum.

Dose.—1 drachm **(4 Cc.)** with a small quantity of Spirit, *e.g.*, 2 drachms of Brandy in ½ tumbler of hot water.

Liquid Extracts of Grindelia, Chekan and Yerba Santa each 1, Liquid Extract of Quebracho 3.

Suggested for use in asthma.

GRINDELINE. *Dose.* — 1 to 2 drachms in water every 2 to 4 hours. A speciality containing Liquid Extract of Grindelia 15 minims, Potassium Iodide 2 grains, Trinitrin $\frac{1}{200}$ grain, Tincture of Euphorbia pilulifera 20 minims in each drachm.

GUAIACI RESINA U.S.

The resin (a constituent to the extent of about 20%) obtained from *Guaiacum officinale* or from *Guaiacum sanctum* (*Zygophyllaceæ*). The resin contains chiefly (amorphous) guaiaconic acid and other constituents. The heart wood of these trees is **Guaiaci Lignum** *Off.*)

Dose.—5 to 15 grains **(0·3 to 1·0 Gm.).**

Soluble almost completely in ether, chloroform, absolute alcohol and in sal volatile.

Petroleum Benzine Solution 1 in 5, should be colourless and not turned green by equal volume Cupric Acetate 1 in 1,000—absence of Resin U.S.

Uses.— In chronic rheumatism and lumbago, and. for chronic sore throats; added to purgatives is useful in gouty persons, and for sluggish liver. It is a laxative in itself. Diminishes sugar in diabetes.

For dysmenorrhœa the most reliable drug, best given in cachets. 10 grains of the resin to be taken three times a day. Sometimes this causes a little flatulence, colicky pain and diarrhœa; if so, it is well to add to each dose 1 grain of Dover's Powder. The patient should begin taking it a week before menstruation is expected.

Guaiacum combined with apiol to check painful menstruation, may be given in malt extract, beginning a week beforehand, two or three times a day; also to relieve amenorrhœa.

Capsules and **Slipules** (No. 1) **of Guaiacum Resin**, 5 grains; also **Tablets of Guaiacum Resin and Sulphur** 3 grains (0·2 Gm.) of each.

Useful for gout and rheumatism, *cf.* **Chelsea Pensioner.**

Elixir Guaiaci.—*Dose.*—1 to 2 drachms. Guaiacum Resin 10, Tragacanth 1, Acacia 1, Syl Pini 50, Simple Elixir to 400.

We have designed this as a preparation suitable as a throat remedy, *e.g.*, in acute tonsillitis.

Tinctura Guaiaci Ammoniata. (*Off.*).

Dose.—½ to 1 drachm.

One of Resin in 5 of Ammonia-Alcohol Solvent, with Oil of Lemon and Oil of Nutmeg as flavourings

Flavoring.—Syl Pini; Syrupus Zingiberis.

This is very useful where the uvula and fauces are enlarged.

Tinctura Guaiaci. *Dose.*—1 drachm. 1 in 5 alcohol (90%).

Trochisci Guaiaci Resinæ (*Off.*). Three grains of Guaiacum Resin with fruit basis.

HAMAMELIDIS CORTEX ET FOLIA.
Witch Hazel Bark and Leaves.

Dose of bark, twigs, and dried leaves, 10 to 30 grains (**0·6 to 2 Gm.**)

The bark and leaves, fresh and dried, of *Hamamelis virginiana* (*Hamamelidaceæ*)—*Off.* Witch Hazel is imported from the United States; it possesses astringent properties.

Uses.—To check hæmorrhages and excessive mucous discharges and for piles. They form the basis of the American Specialities—*Pond's Extract (T.M. 2786/7), (*dose*, 10 drops half-hourly), and *Hazeline (T.M. see 22388, 25193, 26510, 230425, 251717, 256789), (*dose*, ½ to 3 drachms).

Liquor Hamamelidis of Commerce, a distillate of the fresh leaves containing about 14% alcohol by volume. Sp. Gr. about 0·980

Dose.—½ to 3 drachms (**2 to 12 Cc.**), and used externally for piles and by rectal injection for internal piles, and to check epistaxis, bleeding from toothsockets, and is applied to bruises.

BRITISH MADE LIQUOR HAMAMELIDIS.—We had occasion in 1918 to distil a gallon of this from (fresh) leaves cultivated in this country by E. M. Holmes. The aroma was excellent.

For piles, 5 minims of a mixture of equal parts of the liquor and glycerin containing 10% of Phenol, have been injected into piles hypodermically. *cf.* Tom Bird, L. ii./16,149.

Further details on this Liquor, see Vol. II.

Hazel Foam (Martindale). *Syn.* **Skin Food.** A soothing, non-greasy ointment basis. May be medicated with all forms of antiseptics and skin applications, *e.g.*, Ichthyol 3%; Ichthyol 3 to 10% with Resorcin 5%; Salicylic Acid 1%; Liquor Carbonis Detergens 10%; Cade Oil 5%; Carbolic Acid 1 to 2½%.

Cremor Hamamelidis L.H.

Solution of Hamamelis 60 minims, Soft Paraffin 120 grains, Wool Fat (Anhydrous) to 1 ounce.

Extractum Hamamalidis Liquidum *Off.*

Dose.—5 to 15 minims (**0·3 to 1 Cc.**).

A 1=1 preparation of the dried leaves made with 45% Alcohol. The liquid extract is representative of the leaves.

VARICOSE VEINS and consequent ulcers. The following is good. Saturate a double layer of lint with it, cover the part and gently bandage. As it dries do *not* pull off but add more of the extract. Healing rapidly effected.—A. T. Thompson.

Fluid extract, U.S., was a glycero-hydro-alcoholic percolate 1=1.

Flavoring.—Syl Lavandulæ, Syl Menthæ Piperitæ.

HÆMORRHOIDS well treated by interstitial injection of 2 to 5 minims of a 10% solution of Carbolic Acid in Liquid Extract of Hamamelis. A patient who had suffered for a year required 7 injections—another case of 15 years duration needed only 5. The greater the number of piles, the greater the number of treatments required. Patients stated that their rectal and general condition was greatly improved after the first injection.—J. Dunbar, B.M.J. ii./23,808.

" Sterules " of **Hamamelis and Phenol** of the above strength, ½ Cc. are prepared.

Hamamelin.—*Syn.* **Hamamelidin.**

Dose.—½ to 2 grains (**0·03 to 0·12 Gm.**) in pill. The powdered extractive from the bark, of a purplish-brown colour. It is also supplied commercially of greenish colour made from the leaf.

A Suppository of 1 to 3 grains with cacao butter is useful for piles.

℞ ℙ **Compound Hamamelis Suppository.**—Hamamelin 1 grain Orthoform 5 grains, Cocaine Hydrochloride ½ grain, Opium Extract ⅙ grain, Belladonna Extract ⅙ grain, Cacao Butter to 60 grains. For internal hæmorrhoids.

Ⓟ **Suppositoria Hamamelin, Conii et Eucainæ.**

Hamamelin 5 grains, Conium Extract 4 grains, Eucain ½ grain, in Theobroma Oil to 30 grains. Rub down the drugs with a very little warm water and mix with melted Suppository Mass. In painful hæmorrhoids.

℞ ℙ **Suppositoria Hamamelin et Hydrargyri Composita.**

Mercurial Ointment 1 grain, Hamamelin 2 grains, Ergot Extract 1 grain, Belladonna Extract 1/6 grain, Morphine Sulphate 1/6 grain, Tragacanth *q.s.*, Cacao Butter to 15 grains.

The ingredients are used with following intent:—The Mercury to act on prostatic hyperæmia often present with piles. Hamamelin on the mucous membrane, Ergot on the muscular walls of blood vessels, Belladonna the same and sedative, Morphine analgesic and vaso-constrictor. The Theobroma Oil as local mechanical lubricant, and the Tragacanth for consistency.—Campbell Williams.

Tinctura Hamamelidis (*Off.*).

Bark, in No. 20 powder 1, Alcohol (45%) *q.s.* to 10.

Dose.—30 to 60 minims (**2 to 4 Cc.**).

Is given quite irrationally to check bleeding from the lungs or other organs. The tannin to which its local action is due is converted into sodium gallate on reaching the blood—this substance has no remote astringent action.—B. P. C.

An injection for bleeding piles, 1 drachm of the tincture in 3 ounces of cold water should be given as an enema, and retained, at bedtime or before breakfast, every day; or the Ointment applied locally.—R.

A lotion of 1 or 2 drachms with water to an ounce, is a useful application to bruises and small wounds.

Unguentum Hamamelidis (*Off.*).

Same strength in Liquid Extract of Hamamelis as B.P., '98, but basis altered. This Ointment is largely employed for piles.

' Collapsubes ' of this are prepared with rectal tube for piles, *vide* also **Hollow Suppositories.**

Also ℞ ℙ **' Collapsubes ' of above with Cocaine 2%.**

The following is said to work satisfactorily:—Heat on a water-bath Liquid Extract of Hamamelis 2, Starch 1, Glycerin 7, until a jelly is formed, then add Hydrous Wool Fat 8 and Petroleum Oil 2.—P. J. ii./11,631.

HEXAMINA (*Off.*)

$(CH_2)_6N_4 = 140{\cdot}158.$

Syn. **Hexamethylenetetramine. Hexamethylenamina, U.S. P.G.V P. Jap.,** Fr. Cx. Supp. 1920, **Urotropine, Aminoform, Formin Formamine, ✱Cystamine** (T.M. 231533). **Cystogen, ✱Metra mine** (T.M. 262384 and 370133). **Uritone, ✱Vesalvine** (T.M 278095).

Trade Mark: 'Urotropine' No. 215652 ***Avoided*** by Board Trade.—P.J. i./15,339,646.

Dose.—5 to 15 grains (**0·3 to 1 Gm.**) in a large volume of water, c it may be carbonated water.

For children, 3 to 4 grains in water 4 to 5 times during the day.

Manufacture.—Mix 1 Volume of Commercial Formalin Solu tion with 2 Volumes of Liquor Ammoniæ (10%). Allow to star for a few hours in a loosely covered vessel, and evaporate on th water bath to dryness, taking care that Ammonia is in excess durin the process. Recrystallise from Alcohol.

If commercial Ammonium Carbonate is treated with 40% Formic Aldehy solution it readily dissolves even without application of heat, with bri evolution of Carbon Dioxide and formation of Hexamine. Evaporate dryness on water bath under reduced pressure and sublime or recrystalli from absolute alcohol. The Ammonium Carbonate should be about 10 in excess of theory.—J.C.S.A. i./20,292. Other Ammonium salts react sim larly. *ibid.* 373.

Flavoring.—It has only slight bitter taste. Syl Lavandula Syl Rosæ; Syrupus Aurantii.

Colourless crystals, sublimable. ***Soluble*** 1 in 1½ of wate with alkaline reaction, in Alcohol 90% 1 in 8, almost insoluble i Ether. A valuable diuretic and solvent of Uric Acid concretions.

It burns with intense heat and without soot. A 5 grain tablet will boil test tube half-full of water.

Uses.—It relieves cystitis associated with putrefaction an destroys typhoid bacilli in the urine. The pyuria of tabes dorsali cholelithiasis and gonorrhœa (early stages) have been well treated.

As an urinary antiseptic, Hexamine decomposes, liberating Form aldehyde more readily in presence of Acid than Alkali, hence th administration of **Sodium Acid Phosphate** is advised. It may b well to give the latter an hour or two hours *before* the Hexamine.

Investigation of the subject in our laboratories shows that thoug the amount of Formaldehyde liberated from therapeutic doses Hexamine cannot be sufficient to kill *B. Coli, the slow generation Formaldehyde by the drug in the presence of Acid has the desired effec* It is preferable therefore to raise the acid index of the urine withi reasonable limits. *For details of our Work, see Hexamina, Vol. I.*

Common Colds can be aborted by Hexamine. The drug is state to be excreted by the saliva and bronchial mucous membrane, hen the idea. It should be given at once when the discomfort begins,– 15 grains four times during 24 hours in water. Patient should drin water copiously to reduce bladder irritation.

Respiratory affections (acute bronchitis, acute rhinitis etc.,) we

reated. Keep patient indoors, give Cotoin ¼ grain with Soda every 5 minutes for four doses, 6 hours later Magnesium Sulphate 2 teaspoonsful, then Formamine 10 grains (adult) in full glass of water at first thrice and subsequently twice daily. Rhinitis and bronchitis were cured in 3 to 5 days; influenza in from 5 to 7 days. No untoward effects were observed, even when as much as 30 grains daily were given.—Pres. Oct. 1912,257; B.M.J. i./14,1158.

In aural suppuration and meningitis Hexamine has been tried, but neither it nor Formaldehyde could be detected in the discharge or cerebro-spinal fluid.—D. Guthrie, B.M.J. ii./16,455.

In whooping cough may also be of value *e.g.* with Syrupus Thymi.

Sufficiently large doses (75 grains *per diem*) will inhibit growth of bacteria in the bile, *e.g.*, in typhoid. Suggested for treatment of infections of the biliary passages and as a protective measure before operations on the gall bladder or bile ducts. Also for its antiseptic action in threatened or actual cerebro-spinal infections. Experiments on animals show that it may be of value in preventing meningitis. Its prompt use *per os* conveys it to the cerebro-spinal fluid in 30 to 60 minutes. In 35 cases of fracture of the base of the skull with bleeding or escape of cerebro-spinal fluid from the nose or ears meningeal infection never occurred.—Pr., Nov. '09,720; L. ii./12,1231.—Glas. Med. Jl., Nov., 1912.

Acute poliomyelitis. Child aet. 11 became acutely ill suddenly. Weakness of legs. Temperature 104. Hexamine 10 grains every four hours. After two days temperature lower but paralysis more marked. Next day improvement but in the evening after 150 grains had been given, hæmaturia with considerable strangury occurred. After three days paralysis ceased and ultimately the renal symptoms. Complete recovery in sporadic cases is rare.—J. Fox Edwards, B.M.J. ii./16,620.

In bladder diseases 20 to 40 grains daily suffice, while in gall bladder infection, or purulent meningitis, from 200 to 300 grains daily may be required. Give well diluted (2 grains to the ounce of diluent) *per os* or it may, if necessary, be given by rectum or subcutaneously.—A. C. Burnham, Med. Rec., July 5/13, per Pres., Oct., 1913.

Should never be given immediately after meals, but taken in water ½ hour before meals.—B.M.J. i./24,750.

Ringworm of the beard. Treatment.—A 5 to 10% solution of Urotropin is sponged on the part affected. This is allowed to dry and a solution of Dilute Sulphuric Acid 1 to 3% is then sponged over the affected area. There were most gratifying results in the condition known as "foul shave." Where the parasite is the ringworm fungus this method is undoubtedly a specific. It cured the most chronic case when continued for 4 or 5 weeks in gradually increasing strengths.—J. Craik Taylor.

Retention of urine. Treated by **intravenous injection** of 5 to 10 Cc. of 40% Urotropine Solution.—B.M.J.E. i./23,65.—Has been used in cystitis, pyelitis and toxæmias.

Non-diabetic acidosis, due to infection with *B. coli*, well treated by intravenous injections of Hexamine.—J. Fraser, B.M.J. i./24,571.

Hexamine proved conclusively *not* a diuretic.–H. O. Rich, and P. J. Hanzlik, per Pres. Feb. 23,84.

Vesalvine Tablets 5 grains and **Vesalvine Effervescent**, 5 grains in 1 drachm are prepared.

Hexamine Triborate *Syn.* ✱BOROVERTIN (T.M. 317305).
$(CH_2)_6N_4.3HBO_2 = 272{\cdot}182$.

Dose.—15 to 60 grains (**1 to 4 Gm.**) daily.

Manufacture.—By combining 1 molecule Hexamethylenetetramine with 3 molecules of Boric Acid—$3H_2O$ are set free and the Boric Acid is converted into Metaboric Acid.

Crystalline powder containing about 50% Hexamethylenetetramine, readily soluble in water, taste bitter. Urinary antiseptic, *e.g.*, in gonorrhœal cystitis, pyelitis, renal calculus and tuberculosis of the bladder and kidneys—not always successful.

***Vesalvine 'B.'** *Syn.* HEXAMETHYLENETETRAMINE BENZOATE. $(CH_2)_6N_4.C_6H_5.COOH.$ = 262·241.

Dose.—5 to 15 grains (**0·3 to 1 Gm.**).

Small scaly crystals containing about 53% of the base. Made by combining equivalent quantities and crystallising. Soluble 1 in 50 of Water and 1 in 2½ Alcohol 90%.

Uses.—As an urinary antiseptic.

***Cystazol** (T.M. 364369). *Syn.* Hexamine-Sodio-Benzoate.

Tablets.—10 grains (**0·6 Gm.**).

Dose.—One to three dissolved in water twice or thrice daily, in bacterial infections of the urinary tract.

***Uro-Hexoids** (T.M. 365610). Tablets of HEXAMINE AND LITHIUM BENZOATE.

Dose.—One or two after each meal, taken whole or crushed and dissolved in water. Urinary Antiseptic, Diuretic and Anti-lithic.

In cystitis, pyelitis and tuberculosis of the bladder and kidneys, also for chronic posterior urethritis and prostatitis and rheumatic affections.

***Vesalvine 'S.'** *Syn.* HEXAMETHYLENETETRAMINE SALICYLATE. $(CH_2)_6N_4.C_6H_4.OH.COOH$ = 278·241.

Dose.—5 to 15 grains (**0·3 to 1 Gm.**) in water, preferably on an empty stomach.

Colourless prismatic crystals with agreeable sweetish saline taste, containing approximately 50% of each constituent. Prepared by combining equimolecular proportions.

Soluble 2 in 1 in Water and 1 in 2 in Alcohol.

Uses.—This salt should be especially useful as an urinary and intestinal antiseptic, *e.g.*, in cystitis, bacilluria, gastro-intestinal catarrh, colitis, dysentery, diarrhœa, dyspepsia, and all cases beneficially treated by hexamine—it is exceedingly soluble. It doubtless splits up on passing through the system into its two constituents,—the Salicylic Acid enhancing the antiseptic effect of the Hexamethylenetetramine.

B. COLI INFECTIONS OF BLADDER AND KIDNEY.

Alkalinization of the urine should be obtained at earliest possible moment. Where this failed urinary antiseptics often successful. Hexamine Salicylate seems best.—J. Ferguson, B.M.J. i./22,57.

Note.—Though so markedly soluble in water there apparently exists a state of dissociation in solution, for example, Solutions of strength 1%, 3%, 6%, 12%, 25%, 50% and saturated remain clear for months, whilst vigorous rubbing on the sides of the vessel will cause a deposition of Salicylic Acid crystals.

Analysis.—Estimate Salicylic Acid content by titrating with N/10 Sodium Hydrate, using Phenolphthalein as indicator. 1 Gm. should require not less than 34 Cc.

Incompatible with Acids, Alkalis and Carbonates, also with Sodium Salicylate—it throws the Salicylic Acid out from same—and otherwise as Salicylates in general, hence best administered as such, not in a 'mixture.' It decomposes on heating either in water or alcohol on the water bath.

Vesalvine 'S' Tablets 5 grains and **Vesalvine 'S' Cachets** 5 and 10 grains, also **Elixir Vesalvine 'S'** 5 grains in 1 drachm, are prepared.

A dose of 15 grains produced slight dull feeling in the head. This was not felt with 7½ grains.—W. H. M.

A medical man—a sufferer from urinary bacillary infection—found a few doses cleared the urine in 3 days, and that the preparation does not irritate the bladder like other antiseptics, of which he had tried practically all.

Hexamethylenetetramine Camphorate *Syn.* ✱ **Amphotropin** (T.M. 338474) $[(CH_2)_6N_4]_2C_8H_{14}(COOH)_2 = 480{\cdot}494$.

Dose.—8 to 12 grains (**0·5 to 0·8 Gm.**). Tablets 8 grains (**0·5 Gm.**).

A white crystalline powder made by combining in Alcohol, Chloroform, etc. Subject of patent 21728/12.

Soluble in water 1 in 10 with acid reaction. Solutions are hydrolysed to a great extent.

Uses.—Urinary antiseptic. An alkaline urine is rendered neutral or acid by administration. In chronic cystitis, bacteriuria, nephritis.

Hexamine - Sodium Acetate, *Syn.* ✱ **Cystopurin** (T.M. 288836). $(CH_2)_6N_4.2CH_3COONa+6H_2O=412{\cdot}322$.

Contains approximately 34% of Hexamine.

(✱**Cystoformin** (T.M. 374328) is a proprietary preparation of this kind containing 40% of Hexamine).

Dose.—30 grains (**2 Gm.**). A crystalline salt made by evaporating solutions of the components in the above proportions. In gonorrhœa and cystitis.—F.N., 1908,64. **Tablets contain 1 Gm.** (15 grains).

✱**Urodonal** (T.M. 361117). A granular effervescent preparation of hexamethylenetetramine with small amounts of Sidonal and Lysidine.—B.M.J. i./16,364.

Dose.—3 teaspoonsful during the day. The three components are stated to be useful in removing uric acid and allied bodies. Claimed to be of value in rheumatic affections.

✱**Felamine** (T.M. 396797), **Sandoz** (T. M. 439637).

Syn. HEXAMINE GLYCOCHOLATE.

Cholagogue and biliary antiseptic. In catarrhal jaundice, constipation and enteritis and in the after-treatment of typhoid fever and for gallstones. Tablets contain 5 grains (0·3 Gm.).

HYDRARGYRUM.

Hg = 200·6.

Antidotes to Acute Poisoning by Mercurial Salts.—Emetics by mouth, Apomorphine hypodermically; white of 1 egg for every 4 grains of Perchloride (avoid excess), or milk; reduced iron; alcohol or ether for collapse; and opium for pain.

Uses.—Purgative, cholagogue and antisyphilitic.

Purification of Mercury. Allow it to flow in a thin stream through a long column of Nitric Acid. Wash and filter through chamois leather.

Hydrargyrum cum Creta. (*Off.* and B.P. 1898) *Syn.* **Grey Powder.** *Dose.*—1 to 5 grains (**0·06 to 0·3 Gm**). Slipule No. 5 holds 1 grain.

Contains 33⅓% Mercury. Is said to become stronger on keeping by oxidation. That of U.S. is prepared with Mercury 38, Clarified Honey 10, and Prepared Chalk 57. Moistened *q.s.* and dried—has sweet taste and is somewhat damp.

Smallpox (3 cases of confluent) treated with 10 grain doses thrice

daily. Result surprisingly good.—Mercury appears to abort the disease and produces no ptyalism.—B.M.J. ii./10,120.

Injectio Hydrargyri Intramuscularis "10%." *Syn.* INTRAMUSCULAR INJECTION OF MERCURY. F. J. Lambkin's original formula.—B.M.J. ii./05,1257,1348.

Mercury 1 ounce (troy), Anhydrous Lanoline 4 ounces, Liquid Paraffin (Carbolised 2%) to 10 ounces (by volume).

Dose.—This contains 1 grain in 10 minims,—the maximum dose once a week. Physicians should specify '10%' using the above name in full to prevent confusion with stronger preparations.

Sterules, Hypodermic, are prepared containing 10 minims.

Site of Injection.—An area around a point midway between the gluteal cleft and the anterior superior iliac spine is best.—G. Pernet. *Sterilise Syringe in Liquid Paraffin.*

Experiments which we conducted showed that this suspending mixture is probably as useful as any. It holds up the mercury even in hot weather—of great importance for accurate dosage. We compared it *inter alia* with various formulæ containing Cocoa Nut Fat and Vaselin Oil, but came to the conclusion that the cocoa nut fat did not improve matters. Some preparations yield a heavy precipitate at tropical heat.

The preparation is slowly absorbed and practically painless. Diarrhœa, if caused by the injections, may be warded off by 5 grain Cachets of Bismuth Salicylate.

A special preparation of **Mercurial Cream** (1 grain in 10 minims) is also made with a fatty basis containing **Palmitin** (from Palm Oil). In addition it contains Creosote and Camphoric Acid of each 10% (or 20% of the compound called ✱ '**Creocamph**' (T.M. 294289). The Creosote and Camphoric Acid prevent the occurrence of pain sometimes supervening 3 or 4 days after the injection.

Before using Mercurial Cream, Lambkin begins with *weekly* injections of **Calomel Cream** containing 5% Calomel in the same vehicle. *Dose.*—10 minims = ½ grain of Calomel. *cf.* also **Injectio Hydrargyri Subchloridi Hypodermica.**

No Salt of Mercury comes up to Calomel for removing active signs of the disease, but the effect is only transitory in comparison with metallic mercury (¾ grain of Calomel is given once a week for four weeks and *then* metallic mercury). Calomel suspended in Olive Oil is exceedingly painful. The addition of Creosote and Camphor produces analgesia—and can be given with impunity.

Contraindications. Old people, broken down Alcoholics, those with renal disease, with Albumin in the urine, tubercular subjects, those with lead poisoning and gouty persons should not have the treatment.

Injectio Hydrargyri.—STAFF SURGEON ADAMS' FORMULA. ROYAL NAVY FORMULA (G. B. Scott, Roy. Com. on Venereal Diseases).

Dose.—5 minims (=1 grain of Mercury) given once a week. Mercury 20, Anhydrous Lanolin 30, Chlorbutol 2, all by weight, Liquid Paraffin to 100 by measure.

Huile Grise, FR. CX. *Syn.* GREY OIL, OLEUM CINEREUM.

Dose.—An injection of 2 to 3 grains (**0·12 to 0·2 Gm.**) = ⅔ to 1 grain Mercury approx. (**0·04 to 0·06 Gm.**), every eight days for 5 or 6 weeks—or up to seven divisions of the Barthelemy's syringe (*v. infra*), *i.e.*, **0·07 Gm.** Mercury.

Mercury 40, Wool Fat 26, Vaselin Oil (Fr. Cx.) 60—all by weight. Measures 100, *i.e.*, 40% w/v. Mercury (**0·4 Gm. in 1 Cc.**).

Fr. Cx. gives method to produce a thoroughly sterile product.

Barthelemy's Syringe (used in France) is graduated so that when used with a 40% *w/v.* Grey Oil, 1 cgr. of Metallic Mercury is contained in each of its divisions; 14 cgr. or approx. 2½ grains in the syringe-full.

Fournier's Syringe is ½ Cc. in capacity divided into 10 on the barrel so that each division represents 2 cgr. of mercury using the 40% w/v. product.

Levy-Bing-Lafay-Syringe has piston rod graduated into 15 divisions, each of which represents 1 cgr. using the above.

A 10% preparation, e.g., the **Injectio Hydrargyri Intramuscularis** at the commencement of the Chapter suits the ordinary hypodermic syringe better, and is safer as being *more accurately measurable* than the 40%.

Suppositories containing the 40% Grey Oil in various strengths have been used in syphilis. Efficacious, simple, and safe.

Suggestion that a long course of Mercury may render the tissues more vulnerable rather than less so to a future state of activity of Spirochætæ. Mercury is a foe to syphilis but a friend to tertiary ulceration. Better to give Mercury (and Salvarsan) only to remove actual *manifestations* of syphilis and not with view of preventing subsequent signs. Neither drug will *cure* syphilis. —R. S. Wainewright, L. ii./13,1225.

Intravenous Injections of Mercurials are painless, have small dose, are certain of absorption, rapid of action, and do not salivate.

Difficulties of the method, of obtaining consent of patient, possible thrombosis, pyæmic infarction, necessary daily injection. Violent dysentero-diarrhœic symptoms or polyuria and even albuminuria may result.

Solutions of mercuric cyanide, 20 minims of 1% solution (*i.e.*, $\frac{1}{5}$ grain) oxycyanide, biniodide, succinimide and perchloride have been used.

Linimentum Hydrargyri (*Off.*).

Useful stimulant for enlarged joints and glands.

In affections of the peritoneum involving the lower quadrants of the abdomen or pelvis Mercury is without rival. In appendicitis Mercury inunction reduces the pain, mitigates thirst, and effects copious evacuation and urination, also suitable in all cases of infection of the peritoneal serous membrane.

Mercurettes. Oblong Blocks containing 30 grains of mercury incorporated with 60 grains of Cacao Butter. With brisk rubbing spreads over the skin and penetrates. The firm consistence is agreeable in use.

By warming may be spread on the linen to form a mercurial plaster (non-adhesive) for use in synovitis, chronically enlarged glands, and arthritis or for aborting boils and carbuncles.

Pilula Hydrargyri (*Off.* and B.P. 1898), **Blue Pill.** *Dose.*—4 to 8 grains (**0·25 to 0·5 Gm.**).

Contains 33% Mercury by weight.

In raised arterial tension when indicative of danger, a pill twice or thrice weekly, followed by Saline is beneficial.—Brunton.

In syphilis, begin with 3 grains a day after the first and last meal, increasing the daily dose by 1 grain each week till patient is taking 2 grains thrice daily. An average dose is 2 grains twice a day.

In cardiac dropsy it seems to act complementarily to digitalis and to prove efficient where latter has failed to increase urinary secretion materially. It is to be avoided if renal disease be present. When

diuresis is fully established discontinue Mercury and give a mixture of Caffeine and Spirit of Nitre with Infusion of Broom Tops.

Has good soporific effect in forms of biliousness where sleeplessness is a prominent symptom.—W. J. Tyson, Clin. Jl. Aug. 8/23,382.

*** Mercurol,** (T.M. 228096) (*cf.* **Nargol.**)

A combination of mercury with nuclein. Used for gonorrhœal injections ½ to 2% solutions.

Has been given internally in syphilis in 2 grain doses.

Unguentum Hydrargyri (*Off.*).

Off. is now 30% Mercury, as required by F.I. Principally used for inunction in syphilis. To relieve local inflammation and to destroy pediculi.

Fr. Cx. (*Onguent Napolitain*). Mercury 1, Benzoated Lard 1.

U.S.—Mercury 50, Oleate of Mercury 2, Suet 23, Benzoated Lard 25.

Unguentum Hydrargyri Dilutum, U.S. Mercurial Ointment (U.S.) 60, Petrolatum 40.

Inunction treatment of syphilis.—5 Gm. initial dose of Mercury Ointment B.P. '98 diluted to 33%. Directions for treatment of gingivitis if this occurs. Paint with 10% Chromic Acid, or stronger up to even 75%. Give Mineral Waters—Aix la Chapelle, Uriage, Harrogate, etc.—D. Freshwater, Pr. Mar. 1912.

Unguentum Hydrargyri Compositum (*Off.*) is now about 3/5 of '98 strength. B.P. 1898 was Mercury Ointment 10, Yellow Beeswax 6, Olive Oil 6, Camphor Flowers 3. *Scott's Dressing, modified.*

For enlarged glands, chronic synovitis and syphilitic nodes.

Swelling of the ankles is well treated.

Unguentum Hydrargyri Mite, B.P.C. *Syn.* **Blue Unction.**

Mercurial Ointment 1, Lard 2. Mix. For destroying lice.

To promote the removal of the effusion of pleurisies, the rubbing into the chest of half a drachm of Mercurial ointment twice daily is often useful.—Burney Yeo.

Lanolinum Hydrargyri.

Mercury 100, Lanolin (Hydrous) 200, Mercurial Ointment 5, Mutton Suet 50. For inunction in syphilis (effect is rapid); used daily 4 to 8 times after a hot bath. *See also* **Mercurial Injections.**

The idea of using the various fats (wool fat, mutton suet and the lard—in the Mercurial Ointment) was to favour absorption—reference to Liebreich's work and a paper by A. S. Gubb to the M.P.C. 1886.—P.J. i./21,516.

Inunction *at night* probably prevents pullulation of the Spirochaete on the surface of the body—a habitat which these organisms find particularly favourable for perpetuation of their species by transmission to another individual. Sp. Pallidum appears to swarm at night in the tissues of indurated chancres, at any rate.

In hospital practice (army), inunctions and baths for in-patients, with weekly grey oil injections for out-patients, gave satisfaction.—L. ii./11,1386.

Scleroderma with obstinate callous ulcers on the legs improved under mild Mercurial inunctions.—P.R.S.M.—Dermatology Section, Nov. '10, p. 13.

One thorough course of inunction of Unguentum Hydrargyri ⅔ drachm in Lanolin or other base ⅓ drachm, in the early stages (first six months) of syphilis is of inestimable value. Requires care but mortality is small.—Maj. French, B.M.J. i./11,593.

Discussion on the Treatment of Tabes Dorsalis.—Syphilis the important etiological factor without which there would be no such disease as tabes. Inunctions or injections were superior to Mercury by the mouth, and perhaps better by inunction than by injection.—B.M.J. ii./10,1249. Pseudo-tabes—the result of syphilitic meningitis—treated by inunction.—B.M.J. i./09,1403.

Mercury Amalgam.

This is one of the most popular of dental fillings. Black, Cosmos. Vol. xxxviii. page 991, suggests the following: Silver 68·5, Tin 25·5, Zinc 1, Gold 5.

In use, the alloy is worked up in a glass mortar with an equal quantity of Mercury, and the excess of Mercury is squeezed out immediately before filling in. It is the general rule to employ a double filling, *i.e*, to insert an initial filling of zinc oxy-sulphate or oxy-phosphate, *q.v.*, and afterwards an amalgam whenever a metal filling is employed, and where the depth of the cavity will allow.

℗ **Hydrargyrum Ammoniatum.** (*Off.*). **U.S. P.Dan.**

Mercuric Ammonium Chloride, Hg. NH_2Cl (U.S.) = 252·084.

White Precipitate. A white powder, insoluble in water but soluble in hydrochloric acid.

The official name for *Calomel* in Belgium is *Hydrarg. præcip. alb.* —danger of error.—C. Rousseau, B.P. Conf. 1923.

℗ **Unguentum Hydrargyri Ammoniati** (*Off.*).

Strength 5% in Benzoated Lard.

Benzoic Acid in the Benzoated Lard in B.P. *Ung. Hyd. Ammon.* causes the preparation to become faintly yellow in colour. Plain lard does not cause the colouration.—H. Stout, P.J. i./17,187.

In pruritus and other skin affections.

℗ **Unguentum Hydrargyri Ammoniati Dilutum, N.H.W.** Equal parts of the B.P. 1898 ointment, (1 in 10 of Paraffin Ointment), and soft paraffin (white).

Pustular eczema, resulting from pediculosis capitis in weakly children, is well treated with equal parts of this ointment and olive oil, and enclosing in oiled paper cap.

℗ **Unguentum Hydrargyri Ammoniati, U.S.**

1 in White Petrolatum 5, and Hydrous Wool Fat 4.

WET PROCESS. Dissolve Mercuric Chloride 108 Gm. in hot distilled water 2,000 Cc., cool and filter and add further 2,000 Cc. of water. Pour this slowly with stirring into Solution of Ammonia (U.S. is 28%) 60, previously diluted with 2,000 Cc. of water. Allow to settle and decant as closely as possible. Wash with further 5,000 Cc. of water and repeat twice until the liquor is Ammonia-free. Transfer the precipitate after collection on suction filter, to a tared mortar or dish and add water *q.s.* to 220 Gm. Incorporate Anhydrous wool fat, melted, 280 Gm. and finally White Soft Paraffin 500 Gm.—E. R. Jones. Jl. Am. Ph. Ass. Apl. 22,278. Per P.J. i./22,379.

Tinea circinata can be rapidly cured by this ointment.—L.i./09,966.

Unguentum Prophylaxis. For prophylactic measures against syphilis. Metchnikoff suggests the use of Lanolin Ointments containing ℗ White Precipitate 25% or Calomel 25%, or ℙ1 Mercuro-Salicyl Arsenate (*q.v.*) 25%. (*Physicians should specify which is required when prescribing Unguentum Prophylaxis.*) These are less irritating than Mercurial ointment. To be used by inunction for 4 or 5 minutes after coitus. Not efficacious invariably with monkeys. —Neisser.

For use in the Navy—Calomel Ointment 33% made with Lanolin; 50% strength also mentioned in the same paper.

Medical men, students, and nurses advised to have the ointment handy to apply to any suspicious crack about the fingers, etc.

Early application of an ointment of Calomel 10 and Lanolin 20 is said to have prevented syphilitic infection by killing the Treponema.—L. ii./11,1386.

Gelatin Capsules of the ointment, with elongated points to be torn off, and 'Collapsubes' of the ointment are prepared.

Unguentum pro Eczema, N.H.W.

Ammoniated Mercury 10 grains, Lead Acetate 10 grains, Zinc Oxide 20 grains, Mercuric Nitrate Ointment 20 grains, Soft Paraffin ½ ounce, Lard ½ ounce.

Ⓟ **Cremor Lowndes.**—Ammoniated Mercury Ointment 1, Zinc Ointment 3, Glycerin 2, *misce s.a.*—Squire.

Black Precipitate $NH_2Hg_2Cl.=452{\cdot}684$. Formed when Ammonia Solution is added to Calomel. The substance is regarded by some as a mixture of White Precipitate NH_3HgCl and metallic Mercury.—P.J. ii./21,260.

Hydrargyri Benzoas. **Mercuric Benzoate.** Fr. Cx.

$Hg.(C_6H_5COO)_2.H_2O=460{\cdot}766$.

Dose.—$\frac{1}{50}$ to $\frac{1}{10}$ grain (**0·0013 to 0·006 Gm.**)

A white crystalline powder, practically insoluble in cold water (not even with sodium chloride added, as recommended by some), ***soluble*** about 1 in 180 of Alcohol 90%. In pill for syphilis. Injected, large doses necessary and Cocaine may be added.

Intramuscular injections have been given in uterine hæmorrhage.

Septic infections such as septicæmia, pyæmia, erysipelas, puerperal fever, septic sore throats treated by Mercury Benzoate Injections—10 Cc. of 1% Solution which represents average of 1·5 mgr. per kilo body weight. If repeated the body attains a resistance against *Strepto* infections, while smaller doses inhibit the generalised growth of the Cocci. The method can be used indiscriminately in all septic conditions to disinfect the blood and tissues, provided it is applied before the invasion is too extensive or widespread. It is to be regarded as prophylactic rather than curative. It had been observed that mothers taking Mercury shortly before or during childbirth, did not suffer from puerperal infections even though the conditions were most unhygienic, also that syphilitics undergoing mercurial treatment do not catch the ordinary infective diseases.—B.M J.E. ii./13,79.

Fr. Cx. gives mode of preparation, employing Yellow Mercuric Oxide, Acetic Acid (glacial), and Sodium Benzoate.

Hydrargyri Bromidum, Mercuric Bromide. $HgBr_2=360{\cdot}44$.

Dose.—$\frac{1}{16}$ to $\frac{1}{4}$ grain (**0·004 to 0·016 Gm.**). Silvery Scales. ***Soluble*** to the extent of 1 in 250 water; decomposes on boiling.

In syphilis in solution with Sodium Bromide thus,—Mercuric Bromide 1·8 Gm., Sodium Bromide 1·03 Gm., Water 100 Cc. is employed in dose of 1 to 2 Cc. of the solution (=0·01 to 0·02 Gm. Hg.) intramuscularly into the buttock. A platinum-iridium needle is essential. Some pain may be caused.

Hydrargyri Carbolas. **Phenol Mercury.**

$Hg.(C_6H_5O)_2.H_2O = 404{\cdot}756$.

Dose.—½ to 2 grains (**0·03 to 0·12 Gm.**) daily.

A whitish amorphous powder, obtained by double decomposition of mercuric chloride and an alcoholic solution of phenol in caustic potash.

℗ **Hydrargyri Cyanidum,** **Cyanuretum Hydrargyri.** Fr. Cx.; P.G.V. **P. Belg.**, $Hg.(CN)_2 = 252{\cdot}626$.

℗ *Applicable to Ireland.*

Dose.—$\frac{1}{20}$ to $\frac{1}{4}$ grain (**0·003 to 0·016 Gm.**). Fr. Cx. has *max. single dose* $\frac{1}{6}$ grain, max. during 24 hours $\frac{5}{8}$ grain approximately.

Intravenous Dose.—1 Cc. of 1% Solution considered a max. single but more has been given, *see Intravenous Dose Table.*

Is in anhydrous, white or colourless, prismatic crystals. ***Soluble*** 1 in 12 of water and 1 in 4 of glycerin. It is not decomposed by alkalis; it is used as a lotion to syphilitic sores, and given in pills of $\frac{1}{10}$ or $\frac{1}{12}$ grain twice daily. Used in diphtheria, $\frac{1}{250}$ grain frequently, with 1 minim Tincture of Aconite in honey, employing also a gargle, 1 in 10,000.

In syphilis 20 minims of 1% solution daily with caution. Has also been used intravenously. This dose given alternate days. It has been advised for persistent cerebral headaches of the secondary period.—L. ii./12,361. *Intramuscularly* relatively painless but may cause diarrhœa and albuminuria.

If given ***intravenously*** as in combined Organic Arsenic and Mercury treatment of syphilis, care must be taken to give strictly intravenously and not intramuscularly or hypodermically.

Sterules contain $\frac{1}{12}$ grain (0·005 Gm.) in 1 Cc. also $\frac{1}{6}$th grain (0·01 Gm). in 2 Cc.

Syphilis treated by Mercury Cyanide 1% solution intravenously. Routine was one injection of one of the Salvarsan substitutes and five injections of the Cyanide solution per week. Doses of the latter varied with tolerance of the patient, and it was found that many patients could stand 40 to 50 m. so that they received 200 to 250 m. in course of a week. Superior to other routine methods.—J. Ernest Lane, L. ii./21,796.

Syphilis, nasal and aural, is treated by 1 Cc. of 1% solution *intravenously*. Much used in France. May occasion diarrhœa.—D. Guthrie, Pr. Feb. 20,131.

℗1 **Injectio Hydrargyri Cyanidi, Plaistow.** *Dose.*—2 to 10 minims. For subconjunctival use. 1 in 5,000 of water.

Subconjunctival injections of 20 minim doses of 1 in 4,000 solution will cure commencing senile cataract. Pain is very severe, lasting 3 or 4 hours. Patient should be under light chloroform anæsthesia.—Lieut.-Col. H. L. Smith, L. i./12,1056. See also B.M.J. i./06,262.

Metastatic ophthalmia treated by, also given intramuscularly.—Pres. Feb. 21, p. 74.

℗1 **Solubes Hydrargyri Cyanidi et Boracis.**—Mercuric Cyanide 1 Gm., Borax 2 Gm., Potassium Chromate 0·075 Gm., Fluorescein 0·001 Gm. One to be dissolved in a litre of water to produce an antiseptic solution for obstetric work.—L. i./08,876

℗1 **Pasta Hydrargyri Cyanidi.** 1 in 500 in Tragacanth basis for smearing on catheters.

℗1 **Hydrargyri Oxycyanidum,** $HgO\ 3[Hg(CN)_2] = 974{\cdot}478$.

Dose.—1/16 to 1/6 grain (**0·004 to 0·01 Gm.**) *per os.*

Intravenously 1/6 grain (**0·01 Gm.**) in 75 minims (**5 Cc.**) has been given in syphilis, sometimes in less diluent.

Chemical Composition.—Some discussion on this matter has been in evidence in pharmaceutical literature. F. C. J. Bird has a concise statement on it, P.J. i./23,383. The compound, from the point of view of irritating effect on the tissues, and its failing to attack surgical instruments, should in preference be the crystalline body of the above formula and not $HgO\ Hg(CN)_2$. P. Helv. gives the latter formula but the characters and tests agree rather with the compound $HgO\ 3[Hg(CN)_2]$.

Danger of explosion in manufacture.—$HgO\ Hg(CN)_2$, sometimes called the normal Oxycyanide, is dangerous to heat. The other compound is not. See also J.C.S.A. i./1922,640.

Solubility.—This varies with the proportion of HgO present. We find a commercial sample, of the variety preferred, to be soluble 1 in 17 with a small amount of residue.—1924.

The pure salt, *i.e.* the normal compound (*antea*), was found to be soluble 1 in 85½. 'Trade' Oxycyanides, containing various proportions of this body vary.—A. J. Jones, P.J. ii./20,87; i./23,127, see also Comey & Bahn's 'Dictionary of Solubilities.'

Assay.—The content of HgO should be determined. We found 16·7% in a commercial sample.—March 1924. Theory is over 22%.

Uses.—In the treatment of syphilis during first week 0·05 Gm. in pill *pro die* as an average has been given—to be taken when the stomach is full. Should not be used with Potassium Iodide.

As a wound lotion 0·2 to 0·6% solutions have been employed, 1 in 10,000 to 1 in 5,000 as bladder irrigant—in eye work 1 in 1,000 to 1 in 5,000—and 1 in 200 for instruments, which it is said not to attack.

Gonorrhœa treated by irrigation with Mercury Oxycyanide, strength 1 in 2,000, also Potassium Permanganate, 1 in 6,000 for acute, to 1 in 2,000 for chronic cases.—H. J. Blakesley, B.M.J. i./21. 619.

℞ **Mercury Oxycyanide Solubes** are prepared 0·2 Gm. each, 1 in 2 litres gives 1 in 10,000; 1 in 1 litre—1 in 5,000; 1 in 40 Cc. 0.5%.

℞ **Mercury Oxycyanide Lotion Sterules** contain 8·75 grains. Each diluted to 1 pint makes 1 in 1,000 solution, to 1 quart makes 1 in 2,000 solution, 1 in 5 pints makes 1 in 5,000 Solution.

0·2 Gm. per litre (1 in 5,000) as a lotion for cleansing the glans and meatus prior to lavage in gonorrhœa.—Pr., Oct., '10, p. 417. *Iodides should be excluded from a patient so treated.*

Hypopyon ulcers treated by subconjunctival injections.—T. L. de Courcy, B.M.J. ii./21,737 *cf.* Injectio Hydrargyri Cyanidi *antea*.

℞ **Pasta Hydrargyri Oxycyanidi, L.H.**

Mercury Oxycyanide 24 grains, Tragacanth 192 grains, Glycerin 4 ounces, Water to 20 ounces. To be sterile and free from air bubbles.

℞ **Mercuro-Zinc Cyanide.** Lister's Antiseptic. A white powder usually supplied tinted with **Rosalane** (Mauveine Hydrochloride), obtained by precipitation from a cold saturated solution of the cyanide of mercury and potassium by adding a cold saturated solution of zinc sulphate in equi-molecular proportions, or by adding in similar solutions mercuric chloride to zinc and potassium cyanide. The maximum percentage of mercuric cyanide found is 38·5, and the body may be described as a trizincic monomercuric octacyanide—

$Zn_3\ Hg(CN)_8 = 604{\cdot}814$.

It should contain at least 20% Mercury Cyanide, $Hg(CN)_2$. If carefully made can be produced containing 25%.

Estimation process by reduction with hypophosphorous acid.—D. B. Dott, P.J. i./13,98; C.D., Jan. 25, '13.

Lister first used (undiluted) carbolic acid in an operation on August 12th, 1865. Many other antiseptics achieved temporary popularity. Lister tried the Mercurial Salts and in February 1886 the late William Martindale suggested to Lord Lister Mercuric Cyanide. Lister subsequently tried Mercury and Potassium Cyanide, but this in common with others was irritating. Finally the late William Martindale suggested the double Cyanide of Mercury and Zinc which gave Lord Lister entire satisfaction.—"Chemicus," P. ii./15, 325. See also B.M.J. '93, Feb. 18, and B.M.J. i./07,795.

Solubility.—Very slightly in water, more so in dilute acids.

Sterilisation.—It is unnecessary to sterilise Double Cyanide Dressings.

℞ **Mercuro-Zinc Cyanide Gauze** 3% is a popular dressing for applying direct to wounds. It is not so irritant as some of the other mercurial dressings and has the advantage of keeping well without the mercurial salt becoming reduced by the cotton. It is supplied in 1, 2, 6 and 12 yard pieces and with **cotton wool tissue** in 1lb. packets. It is damped before use with 1 in 20 Carbolic Acid solution. **Cotton Wool** as also bandages contain 3%.

For suppurating abrasions, boils and skin affections in war *Dry* Cyanide Gauze covered completely with plaster excellent and rapid. No solution or other antiseptics used.—G. Home, B.M.J. i./16,14.

For visible clean wounds it is good. To be removed by Hydrogen Peroxide when too adherent.—Casualty Clearing Station experience. —A. Don, B.M.J. i./16,648.

℞ **Mercuro-Zinc Cyanide Cream** may be made by triturating the powder with carbolic lotion, 1 in 20, *q.s.*, for applying to hairy parts adjacent to wounds.

℞ **Mercuro-Zinc Cyanide Paste.** Mercuro-Zinc Cyanide 400 Tragacanth 2, Phenol 20, Water 800, mix. For a first dressing for wounds. *Caution*: *Not to be supplied in metal tubes—especially must not come in contact with lead as poisonous Lead Cyanide will be formed*—L. i./15,426. *To insure a thin surface which will immediately dry, the paste must be rubbed on in as thin a layer as possible.*

℞ **Lotion of Mercuro-Zinc Cyanide** of strength 1 in 5,000 to 1 in 1,000, is used for wounds. *Caution*: *Shake bottle—not dissolved.*

℞ **Unguentum Hydrargyri et Zinci Cyanidi, P.O.H.** 1 or 2 in 100 of Soft Paraffin (Silcock's Ointment), or Lanolin. For syphilitic sores and eczema, also excellent for burns and for granular eyelids. *Caution*: *Preferably not in collapsible tubes*, cf. *above.*

℗ **Hydrargyri Iodidum Rubrum. Mercury Biniodide, Mercuric Iodide,** HgI_2=454·44.

Dose.—$\frac{1}{32}$ to $\frac{1}{16}$ grain (**0·002 to 0·004 Gm.**) Fr. Cx.: *Max. single dose* $\frac{1}{3}$ grain; max. during 24 hours $1\frac{1}{4}$ grains approximately.

Intravenously.—$\frac{1}{12}$ grain (0·005 Gm.) in 75 minims (5 Cc.) is usual, but $\frac{1}{2}$ grain (0·03 Gm.) in 150 minims (10 Cc.) has been given. —*See* R. L. Spittel's formula.

℗ **Pills and Tablets** contain $\frac{1}{50}$, $\frac{1}{36}$, $\frac{1}{24}$, $\frac{1}{16}$, $\frac{1}{12}$, and $\frac{1}{8}$ grain.

Red powder or crystals, ***soluble*** in solutions of other iodides, notably potassium iodide, and in solution of mercuric chloride, forming double salts *cf.* Mercuric Potassium Iodide; also 1 in 25 of castor oil, or 100 parts of the latter will dissolve 8 of this iodide with 5 of perchloride of mercury, about 1 in 200 ether, in alcohol 1 in 300.

Uses.—A powerful antiseptic, less irritant than Mercuric Chloride. As a lotion for the hands or eye wash 1 in 5,000. For wounds 1 in 7,000, vaginal douche 1 in 10,000.

℗ **Biniodide Spirit Lotion** 1 in 1,000.

For gonorrhœa dilute solutions are used, also as a pigment or spray for throat in scarlatina and diphtheria.

War Wounds. Acts like hypertonic Saline in producing free discharge and requires frequent changing. Not so painful as iodine.—Casualty Clearing Station criticism.—A. Don, B.M.J. i./06,648.

℗**Injectio Hydrargyri Biniodidi** (pro vagina), L.L.

Mercuric Chloride 8 grains, Potassium Iodide 5 grains, Water to 1 ounce. 1 drachm of this to a pint makes 1 in 10,000 approx.

℗**Unguentum Hydrargyri Iodidi Rubri** (*Off.* and B.P. 1898). Strength 1 in 25.

For tinea may be applied to small spots, but not to large surfaces. Too strong for general use on the skin. Exophthalmic goitre has been treated by daily use of this ointment half strength.

Pernicious anæmia treated by inunction of the Ointment into the skin over the liver in conjunction with arsenic *per os*. The inunction of Red Iodide in this way is useful in many other chronic affections. In syphilis Arsenic added to Mercury yielded as good results as Salvarsan.—J. Craig, B.M.J. ii./13,108.

Parenchymatous goitre best treated by dilute Mercuric Iodide Ointment locally—probably due to the excretion of some of the Mercury into the alimentary canal. In this affection treatment is mainly symptomatic. Improve patient's general condition and comfort. It does not cure the disease—no one pretends it does.—D. J. Harries, B.M.J. i./23,555.

℗**Injectio Hydrargyri Iodidi Rubri Hypodermica (Ragazzoni).**

Dose.—2 to 6 minims (**0·12 to 0·4 Cc.**).

Mercuric Iodide 1 grain, Sodium Iodide *q.s.*, in 64 minims.

In syphilis can be used in large doses, but is painful.

℗**Sterules, Hypodermic,** contain $\frac{1}{12}$ grain in 8 minims for a dose.

℗**Injectio Hydrargyri Iodidi Intravenosa** (R. L. Spittel).

Dose.—120 to 180 minims (**8 to 12 Cc.**).

Mercuric Iodide 3·24 Gm., Sodium or Potassium Iodide 28·42 Gm., N/1 Sodium Hydrate Solution 40 drops or *q.s.*, Water to 1,000 Cc. The solution is rendered carefully neutral using Phenolphthalein, the soda being added last. Often a single injection will produce an effect as phenomenal as Salvarsan. Used in conjunction with latter in syphilis.—L. i./20,378. *Caution.—An average dose of this contains 0·03 Gm. (½ grain).* The amount of caustic soda in the formula in the *Lancet* paper was unnecessarily large; we have given the amount needed, after experimenting.

℗ **Collapsible Tubes** of Mercuric Iodide Ointment 1% with catheter attachment are useful for the treatment of gonorrhœa.

℗Oleum Hydrargyri Biniodidi. *Syn.*—Huile d'Iodure Mercurique. Fr. Cx.

Dose.—15 minims (**1 Cc.**) containing approx. $\frac{1}{16}$ gr. (**0·004 Gm.**)

Mercuric Iodide 4, Olive Oil purified and sterilised 920 by weight. Dissolve at not exceeding 60° C.

ℙ**Pilula Arsenii et Hydrargyri Iodidi.**

Dose.—1 or 2, two or three times a day.

Arsenious Iodide, Mercuric Iodide, of each 1 grain, Distilled Water *q.s.* to dissolve, Sugar *q.s.* to make 12 two-grain pills (or **1 Gm.** of each Iodide in 180 pills). May be combined with 2 grains of Iodide of Iron.

℗**Wool, Mercuric Iodide.** $\frac{1}{4}$%.

Impregnate Absorbent Wool 400 under pressure with a Solution of Mercuric Iodide 1 and Potassium Iodide 1, and spread out to dry.

Ⓟ Hydrargyri et Potassii Iodidum.

HgI_2KI, $1\frac{1}{2}$ H_2O=647·484.

Mercuric Potassium Iodide, commonly known as '*Biniodide*' when referring to Antiseptic Lotions,—made with the double salt. '*Biniodide*' *is, however, a common synonym for Mercuric Iodide.*

Dose.—$\frac{1}{16}$ to $\frac{1}{4}$ grain (**0·004** to **0·016 Gm.**) in pill.

Antidotes.—Olive Oil, Milk, White of Egg, Petroleum Emulsion, warm draughts to encourage vomiting,—later Bismuth and Morphine.—*cf.*, B.M.J.ii./07,1775; i./08,20.

Manufacture. From a hot saturated solution of Mercuric Iodide in Potassium Iodide; on cooling, pure Mercuric Iodide first separates; Mercuric Potassium Iodide $HgI_2KI.1\frac{1}{2}H_2O$ then separates in yellow prisms. Naylor, P.J. i./08,315, uses this method by dissolving Mercuric Iodide 45, Potassium Iodide $16\frac{1}{2}$ (*i.e.*, approximately equimolecular proportions) in water 30, boiling the mixture for a few minutes, allowing to cool for pure Mercuric Iodide to crystallise out, filtering and concentrating the filtrate. Collect the first crop of crystals, rejecting later portions which contain excess of Potassium Iodide. Another method is to use Alcohol 90% 20 instead of the water above mentioned, boil the salts with the Alcohol until almost entirely dissolved and crystallise.

Solubility.—This Salt is not soluble in water except in presence of Potassium Iodide, *i.e.*, sufficient at least to produce the body $HgI_2 2KI$; in other words, the theoretical amount (170 approximately) of Potassium Iodide must be added to 647 (approximately) of the double Salt,—this can be easily shown by experiment, but even an excess of this quantity is desirable in tablet making.

Brought into contact with water, 2 ($HgI_2KI.1\frac{1}{2}$ H_2O) decompose into $HgI_2 2KI$=785·88 and HgI_2 (+Aq.). It is, therefore, impossible to prepare soluble Antiseptic Tablets of this substance alone.

The body $HgI_2 2KI$ is also formed in solution, when three times the weight of Potassium Iodide as of Mercuric Chloride are dispensed altogether,—theoretically the proportion is 2·45 to 1, thus :—

$$HgCl_2 + 4KI = HgI_2, 2KI + 2KCl$$

and this will produce the desired antiseptic effect providing the Potassium Iodide be pure. It makes no difference whether the Potassium Iodide is added to the Mercuric Chloride or *vice versa*.—P.J. ii./06,533,557.

Soluble also in Alcohol 90% 1 in 1 (without decomposition), 1 in 1 in Ether, and about 1 in 2 Glacial Acetic Acid.

For Ⓟ **Nessler's Solution** *v. Vol. II.*

Ⓟ Mistura Hydrargyri Biniodidi, K.C.H.

Dose.—1 ounce (**30 Cc.**).

Solution of Mercuric Chloride 30 minims, Potassium Iodide 10 grains, Ammonium Carbonate 5 grains, Decoction of Cinchona (B.P. '85) to one ounce.

Ⓟ **U.C.H.** has Solution of Mercuric Chloride 60 minims, Potassium Iodide 4 grains, Water to one ounce. Ⓟ **St. M.'s H.** is identical in strength in Mercuric Chloride. Ⓟ L.H. is Solution of Mercuric Chloride 1 drachm, Potassium Iodide 5 grains, Peppermint Water to $\frac{1}{2}$ ounce, *i.e.* it is double the strength.

Uses.—The mercury in these mixtures is more rapidly eliminated than when given alone. The postassium iodide acts as a diuretic. Does not commend itself.—G. Pernet, B.M.J. i./07,730.

For the combined mercury and arsenobenzol *vide* p. 212 also 'Salvarsan by M. and W. Many authorities now advise this treatment.

Keloid well treated by the mixture. The arms of the patient (who had contracted syphilis seventeen years previously) became ulcerated sixteen years afterwards, and subsequently the keloid developed, especially at margins of the scar and bends of the elbows, which could not be extended beyond a right angle. The treatment with Biniodide Mixture in a short time enabled patient to extend the arms to a much greater degree.—P.R.S.M., Nov./10, Derm. Sect., p. 3.

℗ **Pilula Hydrargyri Iodidi Rubri** ($\frac{1}{8}$ grain) **et Potassii Iodidi** (4 grains). *Dose.*—1 twice daily.

℗ **Soaps** containing respectively 3, 1 and $\frac{1}{2}$% of Mercuric Iodide are prepared. Useful for eczema, acne, scabies, ringworm and desquamation after fevers.

℗ **Unguentum Hydrargyri et Potassii Iodidi.**

Mercuric Iodide 1, Potassium Iodide 1, Water 13, Lard 35, Hydrous Wool Fat 50. B. S. H. has 5 grains each of the salts, Water *q.s.*, Lard 1 ounce.

ℙ1 ✱ **'Solubes' Biniodide.**

Contain the equivalent of Mercuric Potassium Iodide 8·75 grains. One in 1 pint of water forms a solution of the strength of 1 in 1,000—suitable for wounds. For lotions and instruments this may be diluted with from 1 to 3 or more parts of water.

ℙ1 **Biniodide Lotion 'Sterules'** contain 8·75 grains. One diluted to $\frac{1}{2}$ pint gives 1 in 500 Solution or to 1 pint gives a 1 in 1,000 solution.

Surgery of the peritoneum.—A report based on information from 70 representative teachers and surgeons. Antiseptics used—Mercuric Iodide in Spirit 1 in 500 to 1 in 2,000, Perchloride 1 in 500 to 1 in 2,000, Iodine, Lysol, Lysoform, various strengths, and others. —H. MacNaughton Jones, L. ii./12,1060.

℗ **Lotio Hydrargyri Biniodidi, L. H.**

Mercuric Chloride 3 grains, Potassium Iodide $8\frac{2}{3}$ grains, Distilled Water to 10 ounces. Strength of double salt, 1 in 500.

Hydrargyri Iodidum Flavum. **Yellow Mercurous Iodide.** $Hg_2 I_2 = 655{\cdot}04$.

Prepared by double decomposition between freshly made Mercurous Nitrate and Potassium Iodide. (Must not be confounded with the yellow variety of Mercuric Iodide). *Dose.*—$\frac{1}{8}$ grain **(0·008 Gm.)**.

Pills and Tablets contain $\frac{1}{8}$ grain. Employed in syphilis.

Hydrargyri Iodidum Viride. Green Mercurous Iodide, Mercury Protoiodide.

Dose.—$\frac{1}{6}$ to 1 grain **(0·01 to 0·06 Gm.)** gradually increased to 3 grains. **Pills** contain $\frac{1}{6}$ and $\frac{1}{3}$, $\frac{1}{4}$ and $\frac{1}{2}$ grain, and **Tablets** contain $\frac{1}{8}$ grain,—with opium and pepper to prevent looseness of bowels.

Incompatible with other iodides.

This salt should be kept from the light, be of yellowish-green colour, and contain slight excess of mercury; otherwise, as the late W.M. showed, it is unstable and dangerous.

Hydrargyri Lactas, Mercurous Lactate.
$Hg_2(CH_3.CH.OH.COO)_2 = 579{\cdot}31.$

Dose.—Hypodermically $\frac{1}{8}$ grain (**0·008 Gm.**) in 15 minims (**1 Cc.**) of water per diem, *per os* $\frac{1}{5}$ grain (**0·012 Gm.**) well diluted.

A crystalline compound, containing about 65% of mercury, ***soluble*** in water, insoluble in alcohol 90%.

May be produced by mixing boiling concentrated solutions of Mercurous Nitrate and Sodium Lactate—the salt throws out with $2H_2O$ in pink rosettes.

Can also be made (white, the more usual form) by dissolving freshly precipitated Mercurous Oxide in excess of Lactic Acid with Water *q.s.* and evaporating.

As an antisyphilitic on account of its safety and solubility. It is stated to be irritating in use in trypanosomiasis.

Hydrargyri Nitras, Mercurous Nitrate.
$Hg_2(NO_3)_2.2H_2O = 561{\cdot}248.$

In colourless monoclinic crystals, generally either damp (from adhering acid) and ***soluble*** in water, or yellow tinted (from basic salt), then not perfectly soluble in water. Used in syphilitic sores, 1 in 30 or more, as a lotion or ointment, and occasionally internally in same dose as mercuric chloride.

Liquor Hydrargyri Nitratis Acidus. (*Off.*)

Used as a caustic for syphilitic warts, and lupus.

Urethral injection 1 in 1,000, or more, in gonorrhœa and for syphilitic sore throat as gargle.

The Fr. Cx. dissolves Mercury 100, in Nitric Acid (Fr. Cx.) 165 and Water 35, mixed, with slight heat, and evaporates to 225 (all by weight). Sp. Gr. 2·246.

Unguentum Hydrargyri Nitratis. (*Off.*)

Syn. Citrine Ointment. Mercuric Nitrate Ointment.

Contains about 1 of Mercury in 15 of the finished Ointment.

The Mercury Solution, by the official process, consists principally of mercurous nitrate before it is added to the fats. There being also an excess of acid present, the chemical action is thus intensified, and by the time the process is completed, by constant and vigorous agitation, all further chemical action will cease, and the ointment should keep of a good colour for months without generating more gases and thus becoming spongy Its preparation requires care, skill, and attention.

For further details vide Vol. II.

Aurinarium Unguenti Hydrargyri Nitratis contains $\frac{1}{3}$ grain of the official ointment—useful for chronic eczema of the meatus.

Unguentum Hydrargyri Nitratis Dilutum (*Off.*).

Contains 20% of Citrine Ointment.

Found to separate at summer temperature. Mercuric Nitrate Ointment 1 Hydrous Wool Fat 1, Yellow Soft Paraffin 3 ; Melt the two latter with gentle heat, remove from flame and add the first and stir while cooling. Keeps well. —C D. i./10,57.

R.O.H. has 10% in Soft Paraffin.

In tinea tarsi of great value, employed with a brush to the eyelids, also in chronic eczema, psoriasis, and herpes preputialis.

In pustular eczema after removing crusts this checks further infection, then employ Lassar's paste and soothing lotions.

Unguentum Acidi Carbolici Compositum. V.H.C.
Mercuric Nitrate Ointment 2, Sublimed Sulphur ½, Phenol 1, Sesame Oil 1, Yellow Wax 1. L. H. has Mercuric Nitrate Ointment 2, Carbolic Acid 1, Sulphur Ointment 2.

Unguentum Metallorum.
C.X. 1917—Mercuric Nitrate Ointment, Lead Subacetate Ointment and Zinc Ointment of each equal parts.—**G.H. is similar.**
Mid. H.—same as C.X. except Dilute Mercuric Nitrate Ointment in place of Mercuric Nitrate Ointment.
Gt. Northern and King's as C.X.—except Lead Acetate Ointment in place of Subacetate Ointment.

Guttæ Hydrargyri Nitratis, L.H. (*Aural*). Mercuric Nitrate Ointment 1 drachm, Olive Oil ½ ounce, Liquid Paraffin to 1 ounce.
Aurinaria are prepared *q.v. antea.*
Nebula Hydrargyri Nitratis, T.H.—Nitrate of Mercury Ointment 20, Soft Paraffin 20, Olive Oil 120, Liquid Paraffin 120. St. Bart.'s H. is 6%.

Ⓟ **Hydrargyri Peptonas.** Mercury Peptonate.
Dose per os.—½ to 1½ grains (**0·03 to 0·1 Gm.**), hypod. ⅙ grain.
Brown powder containing 10% Mercuric Chloride, soluble in water.
Fr. Cx. gives method of manufacture of the Solution.

Ⓟ **Hypodermic Sterules** are prepared containing 15 minims of 1% solution=⅙ grain (**0·01 Gm.**) approx. in each. For injection in syphilis.

℗1 **Hydrargyri Perchloridum.** **Mercuric Chloride, Hydrargyri Chloridum Corrosivum, U.S.**; Corrosive Sublimate, $HgCl_2$= 271·52.

Dose. $\frac{1}{3\frac{1}{2}}$ to $\frac{1}{16}$ grain (**0·002 to 0·004 Gm.**). *Off.*, but in treatment it may be increased to ¼ grain.

Fr. Cx.: *Max. single dose* ⅓ grain. Max. during 24 hours 1 grain approximately.
In heavy colourless crystalline lumps or white powder.

Antidotes. Emetics, Apomorphine, white of 1 egg for every 4 grains of perchloride, *vide* also Poisons and Antidotes at end of book. Mercurial poisoning from surgical use of sublimate especially when left in wounds and cavities should be treated by diuretics. Stimulants for collapse and potassium chlorate for stomatitis.

Mercury line on *gums.* Distinguish from lead line, *cf.* Plumbum, p. 691.

44 grains of Mercuric Chloride in the form of soluble Tablets taken after a full meal,—death followed seven days after. Treatment, lavage of the stomach, antidotes, stimulants and attempts to assist elimination.–L. ii./11,297.

Recovery after 8¾ grains taken by a man of 85. White of egg and water administered, stomach tube passed. Washed out stomach with large quantities of albumen water and milk and water. Strychnine hypodermically and milk and brandy *per os*, hot blankets and bottles. All the while bowels very irritable. During convalescence Cremor Magnesiæ and brandy in milk. Ultimate recovery.—B.M.J. i./13,116. Chronic Mercurial poisoning from prolonged use of an ointment consisting of White Precipitate, Resorcin and Camphor.—Per Clin. Jl. Nov. 21/23,562. *For further data of poisoning faialities see last Edn., p.* 462.

Soluble 1 in 18 Water at 60° F., 1 in 4 of Alcohol 90% at 60° F., 1 in 4·35 Ether (0·720) at 58·5° F. and about 2 in 3 of Glycerin.

Neutral double salts (more soluble) are formed with Mercuric Chloride in solution on addition of Sodium Chloride, Ammonium Chloride and other Metallic Chlorides.

These solutions contain fewer Mercuric ions and are hence *less poisonous* (taking same weights of Mercury) than solutions of Sublimate. We showed that they are not more antiseptic than Sublimate. *Cf.* Data under **Uses**, also Chapter on 'Antiseptic Powers,' *Vol. II.* The late Lord Lister tried one of the Potash Compounds in his earlier work.

The official preparations are Ⓟ**Lotio Hydrargyri Flava** (0·46 to 100, or 2 grains to 1 ounce Solution of Lime), and Ⓟ**Liquor Hydrargyri Perchloridi**, 1 in 1,000 ($\frac{1}{18}$ grain in 1 drachm approx.); *dose*, $\frac{1}{2}$ to 1 dr. *Syn.* **Van Swieten's Solution**, Fr. Cx. (no dose given.)

Incompatibles.—It precipitates most alkaloids from solutions, and should therefore not be ordered with them : the alkalis and the salts of silver and lead are attacked also. Steel surgical instruments should not be dipped in this solution. It forms insoluble compounds with albuminous fluids (*v. infra*), also incompatible with bodies containing tannin, soap, iodine and potassium iodide.

Uses.—A powerful antiseptic. 1 in 1,000 solution kills anthrax spores in 15 minutes, the bacilli themselves being killed by 1 in 15,000 in 1 minute. The growth of the bacilli in question is prevented by 1 in 500,000 strength.—Hale White. Its solution does not pass through animal membrane rapidly, *vide* Antiseptics, *Vol. II.*

Aqueous solutions 1 in 1,000 and more diluted, also Glycerin Solutions are much used as surgical dressings.

In syphilis, given in small doses *e.g.*, $\frac{1}{16}$ grain *t.d.*, has an antiseptic intestinal action and is employed in some forms of diarrhœa of infancy.

For eye lotions 1 in 4,500 parts of water, and for lotions for the nose and mouth and for vaginal leucorrhœa the same strength is suitable. R.O.H. gives $\frac{1}{8}$, $\frac{1}{10}$, $\frac{1}{16}$, or $\frac{1}{20}$ grain per ounce of water for eye lotion.

For gonorrhœa and gleet a lotion 1 in 4,000 to 1 in 2,000 is recommended.

For ear discharges, syringing with 1 in 10,000 is antiseptic.

Chorea has been treated by, with success. Also in paresis, puerperal infection and varicose veins.

In operating on cataract, 576 cases, low percentage of eyes lost by suppuration was due to use of 1 in 2,000 perchloride douche in conjunction with 4% cocaine solution.—L. ii./09,1129.

In stomatitis if the surface epithelium is shed the mucous membrane may be brushed with 1 in 5,000 solution Sublimate.

Syphilitic Treatment during Marriage. The results of Mercury before 1905 (Wassermann Test), especially during pregnancy in the form of Sublimate, 1/16th grain thrice daily, were sufficient almost always to ensure a healthy child.—Amand Routh, B.M.J. i./23,632.

Prickly heat has been treated by rubbing in a lotion of 1 in 1,000 of water containing Hydrochloric Acid (strong) 2. Allow to dry on. If skin tender, wash off again after a few minutes. Usually cures in a couple of days. Repeat if necessary.

500 births during which the parturient women were irrigated with 1 litre of 1 in 1,000 Sublimate Lotion compared with 500 in which there was no vaginal disinfection; 12·8% of the former had fever, whilst only 8% of the undisinfected had it. Deducting those who had fever not originating from the genitalia there remained 5·2% with fever, among the non-disinfected, and 10% among the disinfected. Analogous results by disinfection with Lactic Acid. These results, opposed as they are to fundamental views of antisepsis, are explained by assumption that the hand used in examining is the principal source of infection. Recommendation to employ gloves (specially thin). B.M.J. ii./10,1222.

*For further references to the use of Mercuric Chloride, v.*p. 476.

Ⓟ**Glycerinum Hydrargyri Perchloridi,** U.C.H., is 0·1%. L.H. the same strength, *viz.*, Mercuric Chloride 17½ grains, Distilled Water 6 drachms. Glycerin to 2 pints, tinted blue with *Liquor Cæruleus*, which contains Turquoise Blue 4 grains in Distilled Water 1 ounce. Distinguish from the following:

Ⓟ**Glycerinum Hydrargyri Perchloridi Alcoholicum,** U.C.H.—Mercuric Chloride 35, Glycerin 50, Methyl Blue 0·05, Methylated Spirit to 100. *For disinfecting Urine* ***Caution.***—Not for administration.

Ⓟ**Lint, Absorbent Wool, Gauze,** or **Wood Wool,** *q.v.*, may be impregnated with ½% of each, corrosive sublimate and glycerin.

Ⓟ**Mistura Hydrargyri Perchloridi, E.L.**—Solution of Mercuric Chloride 10 minims, Water to 1 drachm.

Ⓟ**Mistura Hydrargyri Perchloridi Composita.**

Dose.—½ ounce (15 Cc.) in a little water in syphilis thrice daily 30 minutes after food, for adult males.—(*Caution.*=¼ grain Sublimate per dose); females half the dose.

Mercuric Chloride 4 grains, Potassium Chlorate 1½ drachms, Ammonium Chloride 3½ drachms, Compound Tincture of Cardamoms 1 drachm, Simple Syrup 1 ounce, Water to 8 ounces. The Perchloride (= ¼ grain per dose) is tolerated by the addition of the other salts. In syphilis the dosage, as stated, has given valuable results.—J. Bain, B.M.J. ii./12,496.

Ⓟ **Gargarisma Hydrargyri Perchloridi,** (1 in 1,800). Mercuric Chloride ¼ grain, Hydrochloric Acid 1 minim, Glycerin 30 minims, Water to 1 ounce.

R.O.H. has 1 in 4,000 without added Acid.

For influenza, sore throat, especially quinsy, Solution of Mercuric Chloride 1, Acid Infusion of Rose Petals 1. One tablespoonful in a teacup of hot water as a gargle.

Ⓟ**Lotio Hydrargyri Acetica.**

Mercuric Chloride 1, Acetic Acid 75, Glycerin 75, Alcohol (90%) 250, Rose Water 500. To destroy pediculi and detach their ova.

Tinea has been destroyed by 3 grains dissolved in an ounce of Spirit of Nitrous Ether.

Ⓟ**Lotio Hydrargyri Perchloridi, U.C.H.,** Mercuric Chloride 0·2% coloured with methylene blue. L. H. is 1 in 1,000.

Ⓟ**Lotio Hydrargyri cum Acido Carbolico, E.L.**—For pediculi, Solution of Mercuric Chloride 1, Dilute Acetic Acid 2, Turpentine Oil 6, Phenol Solution (1 in 40) to 24.

Ⓟ**Lotio Parasiticida, St. M.'s H.**

Mercuric Chloride ¼ grain, Acetic Acid 2 drachms, Water to 1 ounce.

Ⓟ**Pigmentum contra Tineam.**

Mercuric Chloride 1, Salicylic Acid 9, Phenol 10, Glycerin 80. Efficient in ringworm.

Lotion for alopecia syphilitica,—Mercuric Chloride 3 grains, Acetic Acid 5 minims, Alcohol 90% 8 ounces. Apply with a tooth brush night and morning. Use also Pomade each evening.—Calomel 15 to 30 grains, Salicylic Acid 8 grains, Vaselin 1 ounce.—B.M.J. ii./10,180.

Ⓟ**Mackenzie's Eye Wash.**

Sublimate 1, Ammonium Chloride 6, Belladonna Extract 10, Coccus Cacti $1\frac{1}{2}$, Proof Spirit 55; rub together and add Water to 330. Mix with equal parts of boiling water to bathe the eyes.—*Caution.—This is about five times as strong as usually employed in eye work.*

Ⓟ**Pills** contain $\frac{1}{40}$, $\frac{1}{32}$, $\frac{1}{20}$, $\frac{1}{16}$, and $\frac{1}{12}$ grain.

Ⓟ**Pilules de Chlorure Mercurique Opiacées. Dupuytren's Pills** — Fr. Cx.

Mercuric Chloride 1, Opium Extract 2, Extract of Agropyrum 2 (Extrait chiendent), Licorice Powder *q.s.* Each pill contains Mercuric Chloride 0·01 Gm. and Opium Extract 0·02 Gm.

Ⓟ**Ophthalmic discs** contain $\frac{1}{100,000}$ grain of Sublimate.

Ⓟ**Liquor Hydrargyri Antisepticus W. H.** *Syn.* **Sublimate Disinfectant.**—*Local Government Board.*

Sublimate $\frac{1}{2}$ ounce, Hydrochloric Acid 1 ounce, Soluble Aniline Blue 5 grains, Water 3 gallons.

Ⓟ**Perchloride** ✱**'Solubes'** are made of three sizes, combined with sodium chloride, and coloured blue. They are convenient for surgical purposes, the *largest* containing $17\frac{1}{2}$ grains, making 20 ounces, 1 in 500; the *next smaller* containing 8·75 grains, for 20 ounces of lotion, 1 in 1,000. These may be further diluted with from one to three or more parts of warm water. See strengths of solutions for use, *infra.* The *smallest* ($\frac{1}{2}$ grain) produce a solution of 1 in 4,500 when dissolved in a tumbler of warm water, suitable for ophthalmic work.

Ⓟ**Perchloride Lotion Sterules** contain 8·75 grains. Each diluted to 1 pint with water makes a pint of 1 in 1,000 solution.

(✱**'Solubes'** (T.M. 254730) signify material for preparation of solutions of definite strength for external or local use. A list is given in the Index.)

Strengths of Perchloride Solutions for use :—

Solutions 1 in 10,000 to 1 in 1,000 may be used for infected linen, the walls and floors of infected rooms, the hands of surgeons and gynæcologists, and as a lotion to superficial wounds. For continuous applications 1 in 10,000 forms an active lotion, but 1 in 500 is the minimum strength (with acid added) for use to disinfect excreta. *cf.* Sublimate Disinfectant above.

There is risk of poisonous effects from vaginal injections of 1 in 1,000; watch for the occurrence of diarrhœa.

Ⓟ **Harrington's Solution.**

Mercuric Chloride 0·8 Gm., Water 300 Cc., Hydrochloric Acid 60 Cc., Alcohol 90% 640 Cc. A powerful antiseptic preparation for sterilising the skin before operation.

℗ **"Hydrion" Tablets** contain Mercuric Chloride 4·375 grains, Calcium Chloride 1·86 grains, Sodium Chloride 34·76 grains, Potassium Chloride 0·075 grains, one of which dissolved in a pint of cold water makes an antiseptic solution used with good effect for recent wounds on the hands, feet, head and exposed parts generally. Suggested also for battlefield wounds. The solution is used somewhat weaker on delicate skins, and much stronger in the first immersion of a very dirty wound. The tablets are very hygroscopic and must be kept dry.—Thomas Hissaman, L. ii./14,1438

Ⓟ **Sublimate-Spirit *for Skin Sterilisation.***

Alcoholic Solution of Mercuric Chloride, 1 in 1,000 of 70% Alcohol has been found superior in bactericidal power to Tincture of Iodine, and far superior, cultural experiments showed, to an Aqueous Solution of Sublimate.

Ⓟ **C.H.W.** has **Injectio** 1 in 4,000 and **Injectio Fortior** 1 in 2,000, as vaginal douching for use in labour.

Ⓟ **Tablets,** $\frac{1}{100}$, $\frac{1}{32}$, $\frac{1}{16}$ and $\frac{1}{10}$ grain are for internal administration.

Ⓟ **Hypodermic Tablets,** $\frac{1}{60}$, $\frac{1}{50}$, $\frac{1}{30}$ grain.

Ⓟ **Wool, Perchloride** ('**Sublimate**') 2% 1 lb. rolls.

To prepare, impregnate Absorbent Cotton 100 with 200 of a solution of 'perchloride' 4 and glycerin 2, press to 200 and dry it spread out. Weaker strengths can be prepared on the same lines with less perchloride.

Ⓟ **P. Jap. IV.** uses Mercuric Chloride 2, Potassium Chloride 2, Water 1,500, Wool 1,000, *i.e.*, 0·2%. Faintly coloured with Scarlet or Fuchsin 'S.'

Sublimate-Malachite Green Solution.

A useful non irritant solution.—*See* **Malachite Green.**

Ⓟ **Unguentum Desinficiens** (NEISSER-SIEBERT). Triturate Tragacanth 20 Gm. and Wheat Starch 40 Gm. with Glycerin 170 Gm. Dissolve separately Gelatin 7 Gm. in warm water 500 Cc. and add Mercuric Chloride 3 Gm. and Sodium Chloride 10 Gm. to this solution. While still warm add with stirring the Tragacanth, etc., mixture. Warm on water bath until homogeneous. When cool add Alcohol 90% 250 Gm. in small lots.—Swedish Medical Board, C.D. August 5/22, p. 204.

References.

Lupus, in initial stage, subcutaneous injection of 1% solution into affected tissue has been used.

Empyema, three tappings and two injections of $\frac{1}{4}$ grain Perchloride in $2\frac{1}{2}$ ounces of water with improvement.—B.M.J. i./03,78.

Glossitis treated by a mouth-wash of Mercuric Chloride 2 grains, Hydrochloric Acid 8 minims, Glycerin $\frac{1}{2}$ ounce, Water to 8 ounces.—B.M.J. i./11,536.

For dressing of fistulæ, Wool soaked in 1 in 2,000 Solution of Sublimate is best.—B.M.J. i./11,1048.

Bilharziosis (endemic hæmaturia).—Associated with this disease is almost invariably the appearance of blood and pus in the urine. Mercuric Chloride intravenously has been given with good results.

Antimony Potassium Tartrate Injections as also Emetine (*q.v.* for further notes on treatment) have been successful.

Typhoid treated by intravenous injection of perchloride. Dose employed was 0·01 Gm., but 0·02 Gm. has been used in syphilis.—B.M.J.E. i./09,28.

Primary syphilis has been treated by Iontophoresis of a 2% solution. *Vide* **Iontophoresis.** Vol. II.

Malignant pustule well treated by use of sublimate as dusting powder without incision or excision. An opening a little larger than the pustule is cut in the centre of a piece of plaster, and this is applied so that the pustule appears through the hole. Sublimate is then applied to the pustule so as to cover it entirely, and the opening is covered with another piece of plaster. After 24 hours the dressing is removed. The eschar formed detaches itself in about ten days.—Insterstate Med. Jl., April, 15, per Pres. It has also been treated by hypodermic injection of 1 in 1000 solution.

Mercurialised Serum. This has been found preferable to Salvarsanised Serum. Albuminate of Mercury is used. It is precipitated from Mercuric Chloride and redissolved in excess.

It is available in the following strengths :—
No. 1. Containing 1/50th grain Mercuric Chloride in 30 Cc.
No. 2. Containing 1/35th grain in 30 Cc.
No. 5A. (For intramuscular or subcutaneous use), containing 1/12th grain.
No. 5B. Containing 1/6th grain in 8 Cc.

Uses.—Tabes, general paralysis, tabo-paralysis and cerebro-spinal syphilitic meningitis well treated.

Ⓟ Sal Alembroth.—*Syn.* **Ammonio-Mercuric Chloride.**

$HgCl_2.2NH_4Cl,H_2O = 396{\cdot}536$.

May be made by mixing solutions of equivalent quantities of Sublimate and Ammonium Chloride and evaporating ; 3 grains represent approximately 2 grains of sublimate. A powerful antiseptic, but does not combine with albumin so quickly, and hence is not so irritating. ***Uses***—In medicating dressings, **Bandages, Gauze, Wool Gauze,** and **Wool Tissue,** 1 or 2% (which are dyed blue), also as an intramuscular injection for syphilis. (*Dose,* 10 minims of 5% solution. Painful. Slowly eliminated.)

Soluble 2 in 1 of Water, 1 in 4 of Alcoho 90%, also in Glycerin.

Hydrargyri Salicylas.

Dose.—$\frac{1}{3}$ grain (**0·02 Gm.**) (internally). P.G. gives this as maximum single dose. Intramuscularly $\frac{1}{10}$ grain in 10 minims Liquid Paraffin (increased up to $\frac{3}{4}$ grain). (Cocaine Salicylate may well be added).

$C_6H_4\begin{cases} O— \\ CO.O \end{cases}>Hg = 336{\cdot}667$. It is also official in P. Ital. IV.

A white powder containing about 59% of mercury, very slightly ***soluble*** in water (but soluble in solutions of sodium hydrate and sodium carbonate), scarcely soluble in alcohol 90%. ***Used*** as an antiseptic and antisyphilitic and as a dusting powder or ointment for sores. Should not be given in large doses with potassium iodide.

This is the basic mercuric salicylate as distinguished from the neutral or normal salt (*vide* below) Hydrogen sulphide distinguishes easily, the normal salt being precipitated at once, this one slowly. Two mercurous salts are also known.

As an injection for gonorrhœa 15 minims of a mucilage suspension 1—300, has been used.

Hydrargyri Salicylas, Neutrale. $(C_6H_4.OH.COO)_2Hg = 474{\cdot}75$.

Dose.—Hypodermically $\frac{3}{10}$ to 1 grain suspended 1 in 10 in Liquid Paraffin. Comparatively non-irritant.

Quinine Urea (2%) added to the injection relieves pain—thus the injection may be made as follows :—

Quinine Urea 2, Water 2, solve and mix with Anhydrous Wool Fat 20. To this add Mercuric Salicylate 10, Liq. Paraffin *q.s.* to 100.—Pres., Oct., 1912.

Prophylaxis of Syphilis. The following jelly in Collapsible tubes, Neutral Mercury Salicylate 10, Irish Moss 5, Water 85, according to Beddoes is used for smearing over the parts, it is not too strong for use to the tongue and other mucous surfaces. *N.B.*—*With caution.*

Mercurosal. *Syn.* Di - Sodium - Hydroxy - Mercuri - Salicyl - Acetate

$C_6H_3COONa.OCH_2COONa.HgOH.$ = 456·693.

Dose.—$\frac{3}{4}$ grain (**0·05 Gm.**) intramuscularly. $1\frac{1}{2}$ grains (**0·1 Gm.**) intravenously in 5 Cc. of water. A white powder freely soluble in water. Used in syphilis intravenously it does not irritate veins. It is less toxic than Mercuric Chloride.

Hydrargyri Subchloridum, Mercurous Chloride. *Syn.* Calomel, **Mercurius Dulcis, Ph. Ned.** HgCl=236·096.

Hydrargyri Chloridum Mite. U.S. *Syn.* Précipité Blanc (distinguish from British White Precipitate).

Dose.—$\frac{1}{2}$ to 5 grains (**0·03 to 0·3 Gm.**). U.S., *average laxative* $2\frac{1}{2}$ grains, *alterative* $\frac{1}{4}$ grain. Fr. Cx. has maximum single dose 15 grains, maximum during 24 hours, 15 grains.

Heavy white powder. We have also prepared it as *small, soft, scaly crystals* for eye work. **The Finely Divided Calomel of Duret** (Vol. II.) is similar to this.

Insoluble in water, ether or alcohol.

Incompatible with acids, alkalis (*see* Lotio Nigra p. 480, with sodium and potassium chloride and with bromides, iodides, sulphur, cherry laurel water, and antipyrin.

With regard to Calomel and Sodium Chloride the usual view is that Mercuric Chloride may be formed. We know a case of a young man remarkably fond of salt who took 2 grains of Calomel after a big dinner. He was exceedingly ill and an emetic was necessary.

Taken internally, it is converted into Mercury Sulphocyanide with traces of Mercury-Albumin compounds. Since the solubility of Mercury Sulphocyanide is markedly increased by alkali chlorides, salt should be withheld from patients taking Calomel.—P.J. ii./10,438.

Uses.—Alterative and purgative. Was always considered a cholagogue, but at the present time is thought to empty the gall bladder only, not to increase the actual amount of bile formed. Most useful purgative for congested liver and dyspepsia generally. To be given at bed-time, followed by morning saline draught. Useful where there is intestinal putrefaction, *e.g.*, in dysentery, fæcal accumulation, typhoid. For torpid liver $\frac{1}{4}$ grain doses hourly valuable. As dusting powder to ulcers and many skin diseases (but not to the cornea of the eye if Potassium Iodide is being given). Applied dry relieves pruritus ani. In syphilis Calomel fumigations are sometimes excellent. In optic neuritis weekly injections of $\frac{3}{4}$ gr. have been successful.

Gall stones are often expelled after large doses of Calomel followed by Castor Oil.—Whitla, Pract. Med.

For neurasthenia and neuralgia, intestinal antisepsis is required, Calomel may be useful.

Asthma is relieved by ½ to 2 grain doses. Give ½ grain at feeling of onset of attack.—B.M.J. ii./09,882.

Violent mania.—Calomel 30 grains administered to a violent maniac slightly under the influence of Chloroform subdued the patient after effecting profuse purging and vomiting. The patient slept and woke in a perfectly calm frame of mind.—Murray.—"Rough Notes on Remedies," P.R.S.M., Nov. '10, Baln. Sect., p. 7.

Diarrhœa.—Large doses of Calomel. 20 grain doses repeated twice in the first 12 hours in the acute enteritis met with in the Tropics with temperatures ranging between 103° and 106° and highly offensive 'coffee-grounds' evacuations—most successful. In dysenteric diarrhœa whether bacillary or amœbic, with or without rise of temperature, 12 grains repeated twice in the 12 hours is perfectly safe, but whether constipation be present or absent 1 grain every three hours in 12 doses results in pronounced salivation in adults—the same would occur with this dosage in children, though they are known to be much more tolerant of Calomel.—H. D. McCulloch, B.M.J. ii./12,1428.

Infants with diarrhœa may receive 2 grains. If vomiting add equal quantity of Cerium Oxalate.—W. E. Fellowes, B.M.J. ii./21,176.

Amœbic dysentery treated by Calomel and Magnesium Sulphate, followed by Salol, Bismuth Salicylate and Dover's Powder, 5 gr. of each in cachets.—N. Cantlie, Jl. Trop. Med. Feb. 1/23,43.

Asiatic Cholera might well be treated with 5 grain hourly doses of Calomel—increasing to 10 grains if necessary.—W. E. Fellowes, B.M.J. ii./21, 176.

Quinsy.—Calomel placed on the tongue in ⅙ grain doses and repeated every half hour for 12 to 18 hours stated to abort a quinsy. If used before suppuration occurs it may abort in 18 hours without purging. In two cases where suppuration had begun within the tonsil the method failed and strongly purged the patient.—B.M.J. ii./12,1249.

Peenash, Treatment of.—Peenash is due to the ravages of the larvæ of *Lucilia Macellaria*. One drachm of powdered Calomel blown into the nose or affected cavity kills the larvæ and causes them to drop out; washing out afterwards with a lotion will bring out the deeper seated ones. Infections with *Dermatobia noxialis* also treated in the same way.—B.M.J. i./11,362

Enuresis, give ¼ grain daily to regulate bowels.—B.M.J. i./06,905.

In raised arterial tension where indicative of danger, ½ or 1 grain pill once or twice weekly followed by saline in the morning keeps down pressure.—Brunton.

Suspicious cracks or hangnails should have this ointment well rubbed in:—Calomel 33, Vaseline 10, Anhydrous Lanolin 57.—*Cf.*

Unguentum Prophylaxis.

Calomel Ointment 30% used as a prophylactic for syphilis in rabbits, proved efficacious up to 8 hours after inoculation with the disease. Death from mercurial poisoning produced by single application of a large amount of the ointment.—H. Nichols and J. Walker, per Jl. Trop. Med., June 15/23,223.

Calomel Tablets, $\frac{1}{10}$, $\frac{1}{6}$, ½, 1, 2, 3, 4, and 5 grains.

Injectio Hydrargyri Subchloridi Hypodermica. Lambkin's Original Formula.

In syphilis, Calomel 10 grains, suspended in Sterile Olive Oil containing 2% carbolic acid, ½ ounce. *Dose.*—10 minims injected once

a week. Calomel is quickly absorbed but intensely painful, best used only as heroic measure.

Poisoning, fatal, from intramuscular Calomel injections.—B.M.J.E. i./22,49.

Sterules of Calomel of this form are prepared containing the 10 minim dose=½ grain Calomel approx. Also containing ⅙, ¼, ¾, and 1 grain of Calomel.

Morphine ¼ grain should be given afterwards to relieve pain.

Calomel injected with Oil in this way is partly converted into a soluble compound (probably Mercuric) and absorbed by the lymphatics and blood vessels and is partly taken up by Leucocytes and converted into a soluble compound within these.—Marshall.

Ⓟ **Lotio Hydrargyri Nigra** (*Off.* and 1898). Black Wash.

Mercurous Chloride, Glycerin, and Solution of Lime, about 1 in 150. Tragacanth Mucilage is now omitted. Contains Ⓟ **Mercurous Oxide*** Hg_2O=417·2.

Ⓟ **Unguentum Cinereum** containing Mercurous Oxide 1 in 10 or 20 of lard has been prescribed for syphilis—distinguish from Oleum Cinereum *q.v.*

Ⓟ **Gargarisma Hydrargyri Composita.**

Black Wash 1 ounce, Potassium Chlorate 10 grains, Water 1 ounce. For syphilitic throats.

Pilula Hydrargyri Subchloridi, Rhei, Cascara et Capsicin.

Calomel ½ grain, Rhubarb Extract 2 grains, Cascara Extract 1 grain, Capsicin ⅛ grain.

Relieves constipation, *e.g.*, that arising from large doses of Bismuth in treatment, see also Mistura Bismuthi, Phenolis et Morphinæ.—B.M.J. ii./10,184.

Pulvis Basilicus.

Dose.—For a child of 2 years, 4 grains (**0·25 Gm.**); of 6 years or upwards, 8 grains (**0·5 Gm.**).

Mercurous Chloride 3, Scammony 3, Acid Potassium Tartrate 3, Jalap 1, Ginger 1, Antimonial Powder 1.

Suppositoria Hydrargyri Subchloridi, L.H. Contain ½ or 1 grain of Calomel in each.

Unguentum Hydrargyri Subchloridi.—*Syn.* Calomel Ointment (B.P. 1898) was Mercurous Chloride 1, Benzoated Lard 9. It is now *Off.* double strength. A skin application which may relieve itching. —See also **Unguentum Prophylaxis.**

Calomel Cream, L.L. Calomel 10 grains to Vaseline 1 ounce. Distinguish from that of Lambkin—*q.v.*

Hydrargyri Succinas. $C_2H_4.(CO.O)_2Hg$=316·652.

Dose.—¼ to ⅓ grain (**0·016 to 0·02 Gm.**).

White Powder *soluble* in Normal Saline Solution 1 n 40, 1 in 7 of 5% Sodium Chloride Solution, 1 in 5 of 10% Sodium Chloride, 1 in 2 of 30% Sodium Chloride Solution by experiment. The first solution may be used for injection—practically insoluble in plain water.

Hydrargyri Succinimidum, Imido-succinate of Mercury.

$[C_2H_4(CO)_2N]_2.Hg$=396·72.

Dose.—By injection, ¼ to ⅓ grain (**0·016 to 0·02 Gm.**).

* Note —Ⓟ "Precipitate, Red and all Oxides of Mercury."

Prepared by adding freshly precipitated Mercuric Oxide 108 to a warm aqueous Solution of Succinimide 99 and evaporating to obtain crystals.

(**Succinimide** $C_2H_4\{^{CO}_{CO}>NH = 99{\cdot}068$ is made by dry distillation—preferably under reduced pressure—of either acid or neutral Ammonium Succinate. Recrystallise distillate from water.)

Mercury Succinimide is a white powder, ***soluble*** in water about 1 in 28. Hypodermically in syphilis has been used in $2\frac{1}{2}\%$ solution = slightly over 1% of mercury. Addition of cocaine nitrate diminishes pain.

Our experiments showed it to be somewhat more soluble in normal saline—*i.e.*, 1 in 25, still more in 10% Sodium Chloride Solution, *i.e.*, 1 in 9, 1 in 14 of 5%, also 1 in 6 of 30%.

℞ ℙ **Sterules, Hypodermic** of Mercury Succinimide, contain $\frac{1}{3}$ grain with Cocaine Nitrate $\frac{1}{6}$ grain.

Hydrargyri Sulphas. Mercuric Sulphate.

Syn. **Hydrargyri Persulphas.** $HgSO_4 = 296{\cdot}66$

Dose.—2 to 5 grains (**0·12 to 0·3 Gm.**).

A white powder made by dissolving Mercury in boiling strong Sulphuric Acid. Water decomposes it with formation of yellow **Turpeth Mineral, Hydrargyri Subsulphas** Fr. Cx. **or Mercuric Oxysulphate,** $HgSO_4 2HgO = 729{\cdot}86$.

It is a prompt emetic in dose of 2 to 5 grains which was given to children in croup and diphtheria to expel false membrane. Does not produce purging. **Turpeth Mineral Ointment, Bazin's Ointment,** is 1 in 30 of Benzoated Lard. Used for ringworm.

Mercurous Sulphate, $Hg_2SO_4 = 497{\cdot}26$.

A whitish crystalline powder slightly soluble in water and in dilute nitric acid. This salt, as also Mercuric Sulphate mixed with Potassium Bisulphate, is used for construction of electrical cells.

Hydrargyri Tannas, Mercurous Tannate.

Dose.—$1\frac{1}{2}$ grain (**0·1 Gm.**) in a pill. Should it cause diarrhœa in weakly patients add $\frac{3}{4}$ grain of tannic acid to each, or $\frac{1}{2}$ grain of opium.

In dark green, odourless and tasteless powder or scales, containing upwards of 50% of mercury. It is not soluble or materially affected by diluted hydrochloric acid, but is decomposed by alkalis. Pills are made containing 1, 2, 3, and 4 grains.

℗ **Unguentum Hydrargyri Oxidi Flavi.** *Off.*

℗ **Yellow Mercuric Oxide** (HgO = 216·6. Made by precipitating Mercuric Chloride with Sodium Hydroxide Solution) in very fine powder 1, Soft Paraffin, yellow, 49. The powder and the resulting ointment should be neutral to moistened litmus paper.

Incompatibility.—Should not be used whilst patient is taking Iodide—violent irritation may be produced.—B.M.J.E. i./09,84.

Used for inflamed eyelids. ℗ **Pagenstecher's Ointment** is 4%, *i.e.*, double this strength; ointments of 1·25, 2·5, 5, and 10% are also prepared. Syphilitic sores and eczema are well treated by the 1·25% ointment.

Martindale's Method of Manufacture.

We recommend the Yellow Mercuric Oxide *to be freshly precipitated an converted into ointment without preliminary drying.* This produces a perfectl smooth ointment free from grit. It can be effected by taking the equivalen of Mercuric Chloride to start with. To manufacture say 10 Kilo of the Oint ment of 10% strength, 216·6 parts of HgO are produced from 271·52 of HgCl

therefore $\frac{271{\cdot}52}{216{\cdot}60}$ = 1·25 kilo of Corrosive Sublimate will produce 1 kilo o Yellow Mercuric Oxide on precipitation with Sodium Hydroxide (Solution must be very dilute). This is carefully washed until the washings do not re act with either Silver Nitrate or Phenolphthalein, and pressed in suitabl linen free from "fluff," and finally in this moist condition is made up to 10 kilo with Paraffinum Molle (Yellow should be quite as suitable as white). Th amount of moisture in the precipitate is easily ascertained and allowanc made for, and *is reducible, by pressing to a very small amount.* Weaker strength can then be prepared from this 10% bulk, as desired, by dilution with Para ffinum Molle. If kept exposed to light, Yellow Ointment may turn dark o the surface. If desired, the ointment may be kept under water, or be place in 'Collapsubes' (strengths as above mentioned). We have examined th contents of such Collapsubes two years after preparation and find same i good condition.—W. H. Martindale, Oph., Nov., 1906; L. ii./06,1459.

R.O.H. also adopts this method. ½ to 2% strength.

Ⓟ **Pasta Flava, Gt. Orm. H.**

Yellow Mercuric Oxide 15, Zinc Paste to 440 (Zinc Paste in this instance i Starch 108, Zinc Oxide 108, Soft Paraffin to 440).

Ⓟ Unguentum Hydrargyri Oxidi Rubri.

Syn. RED PRECIPITATE OINTMENT. (*Off.* and B.P. 1898).

Red Mercuric Oxide, in very fine powder 1, Paraffin Ointment 9. For use in chronic skin affections.

The Red Oxide is crystalline, and the Yellow (by precipitation) amorphous, but they are chemically identical.

Ⓟ **U.S. VIII.** had Red Oxide 1, Water 1, Hydrous Wool Fat 4, Petrolatum 4.

Lanolin used for this ointment, if applied over large surfaces may lead to severe Mercurial poisoning and is, therefore, to be avoided.

20 grains of Red Precipitate has been known to produce poisoning. There was vomiting after the dose, and finally death.—W.H.M. Dec. 1923.

Ⓟ **Pommade de Lyon.** Red Mercuric Oxide 1, Vaseline 15.

Ⓟ **Unguentum Rubrum cum Cantharide. V.H.C.** 1904. Red Mercuric Oxide 1, Vinegar of Cantharides 1, Soft Paraffin 6.

Hydrargyri Sulphidum Rubrum. *Syn.* VERMILION, CINNABAR. HgS = 232·66. Brilliant red powder insoluble in water and dilute acids prepared by subliming a mixture of Mercury and Sulphur. Both this and the black variety, **Hydrargyri Sulphuretum cum Sulphure** of same composition are not now employed therapeutically to any extent.

Ⓟ **Unguentum Rubrum** (Blackfriars).—N. H. W.

Vermilion 6 grains, Red Mercuric Oxide 6 grains, Creosote 2 minims, Lard to 1 ounce.

Hydrargyri Naphthol-acetas. Mercuric - β - Naphthol Acetate $Hg.C_{10}H_7O.CH_3COO = 402{\cdot}74$

And the **Thymol Acetate** $(CH_3COO)_2\,Hg$ $(CH_3COO.C_{10}H_{13}O)\,Hg$ $= 727{\cdot}456$ are insoluble powders with *Dose.*—½ to 1 grain **(0·03 to 0·06 Gm.).** Schmidt gives method of manufacture.

They are antisyphilitics. The latter has been used as an intra-muscular injection suspended 1 in 10 in liquid paraffin.

Ⓟ **Hydrargyri Sulphocyanidum** *Syn.* MERCURIC RHODANIDE $Hg.(CNS)_2 = 316{\cdot}746$.

White powder slightly soluble in water. Swells up on burning, producing "PHARAOH'S SERPENTS"

Hexamine Compounds of Mercurial Salts, Acetate, Cyanide and Sulphate have been made. The inclusion of Hexamine reduces corrosive effect.—C. D., Mar. 31/23, p. 436.

For further Organic Mercurial Compounds see Vol. II.

HYDRASTIS RHIZOMA.

Syn. GOLDEN SEAL.

NOTE.—*The preparations of this drug should be treated as Poisons in view of their uses, though we know of no actual fatalities from them.*

Dose.—10 to 30 grains (**0·6 to 2 Gm.**).

The dried rhizome and rootlets of *Hydrastis canadensis* (*Ranunculaceæ*). *Off.* not standardised. U.S. & P.G.V. is standardised to 2·5% Hydrastine. Hydrastis Leaves and Tops also contain Hydrastine.

For assay and data on Chemistry of the Alkaloids, cf. Vol. II.

Uses.—*Internally* it possesses tonic stomachic properties, being useful in general debility,—action not unlike that of quinine. Is used in intermittent fevers. The drug and the alkaloids Hydrastine and Hydrastinine cause uterine contraction and are efficient remedies in checking menorrhagia and in relieving dysmenorrhœa. Contains in addition to Hydrastine (1·5 to 3%) a quantity of Berberine, *q.v.* In gastric catarrh from chronic alcoholism is about the best substitute for the stimulant when this is abandoned. It is useful in fibroid tumours; does not cause painful contractions. Local application is often successful in chronic pharyngitis. In goitre it is successful.

Externally it is employed in chronic inflammation of the mucous membrane, also for cracks and fissures of the nipple. It stimulates unhealthy ulcers, and as a lotion (1 in 20 of liquid extract) checks profuse sweating, employed in acne and seborrhœa and stops nose bleeding. In gonorrhœa, more particularly the late stages, both locally and internally is of value; as an injection 1% solution of the liquid extract (or combined with 1% of Protargol and 5% Glycerin) is recommended.—H.

Ⓟ**Infusion** of 1 drachm in 8 ounces boiling water useful in vaginal gonorrhœa and leucorrhœa.—H.

Flavoring of Liquid Hydrastis preparations.—Syl Lavandulæ. Glyl or Syl Pini (in bold dose); Elixir Aurantii, Syrupus Limonis.

Ⓟ**Capsules** are prepared each equivalent to 30 minims.

Extractum Hydrastis Liquidum. *Off.*

Dose.—5 to 15 minims (**0·3 to 1 Cc.**) Is made with 60% alcohol, standardised to 2% Hydrastine. FR. CX. extracts with 70% alcohol.

In pruritus ani for the varicosity of piles inject daily one or two ounces of the following, mixed:—Liquid Extracts of Hydrastis 2, Hamamelis 16, Ergot 2, Compound Tincture of Benzoin 2.

℞ **Mistura Hydrastis et Ergotæ.**
Liquid Extracts of Hydrastis and Ergot of each 30 minims, Chloroform Water to 1 ounce for a dose.

This is one of the most powerful remedies for menorrhagia, and so also is a mixture of Hydrastis and Hamamelis.—W. W. W.

℗ **Mistura Hydrastis Composita, W.**—Liquid Extract of Hydrastis and Liquid Extract of Hamamelis each 15 minims, Cinnamon Water to 1 ounce.

℗ **Extractum Hydrastis.** *Syn.* HYDRASTINUM.—Prepared by alcoholic extraction. *Dose.*—2 to 5 grains (**0·12 to 0·3 Gm.**)

FR. CX. prepares with 60% alcohol and evaporates to soft extract.

Uses.—Aperient, cholagogue, stomachic, and tonic. 3 to 6 grains in a pill, followed by Effervescing Sodium Sulphate, is a useful biliary stimulant; is also used as a dressing to ulcers, acting as an antiseptic.

℞ **Hydrastina, Hydrastine,** U.S. FR. CX.
$C_{21}H_{21}NO_6$=383·281.

Dose.—$\frac{1}{2}$ to 1 grain (**0·03 to 0·06 Gm.**). FR. CX. has max. single dose $1\frac{1}{2}$ grains, Max. during 24 hours $4\frac{1}{2}$ grains approx.

Pills containing $\frac{3}{4}$ and 1 grain are made.

An alkaloid in white prismatic crystals, slightly soluble in water, but soluble in alcohol 90% 1 in 150, chloroform 1 in 2, and ether about 1 in 90; taste very bitter.

℞ **Hydrastinæ Hydrochloridum.** **P. Belg.** $C_{21}H_{21}NO_6HCl$= 419·749. + Aq. *Dose.*—$\frac{1}{2}$ to 1 grain (**0·03 to 0·06 Gm.**).

A crystalline soluble salt; said to act as an expectorant.

M.pt. is stated to be 116° C.; the air-dried salt melts at a decidedly lower temperature, and when dried near 100° C. the M.pt. is 168° C.—D. B. Dott, P.J. ii./22,607; i./23,10.

Found to produce uterine action and induce abortion, without danger to the patient, injected hypodermically.

℞ **Tablets, Hydrastine Compound.**—Hydrastine Hydrochloride $\frac{1}{4}$ grain, Ergotin $\frac{1}{2}$ grain, Cannabin Tannate $\frac{1}{2}$ grain. Efficient in checking menorrhagia and post-partum hæmorrhage.

℞ **Hydrastininæ Hydrochloridum.** FR. CX., P. ITAL.
$C_{11}H_{11}NO_2.HCl$ (P.G.V. and U.S. Formula) = 225·619.

Dose.—$\frac{1}{2}$ grain (**0·03 Gm.**) *per os* or hypodermically in 10% solution. FR. CX. has Max. single dose $\frac{3}{4}$ grain, Max. during 24 hours $2\frac{1}{4}$ grains approx.

A salt of ℞ **Hydrastinine,** $C_{11}H_{11}NO_2$ =189·151 + Aq. (FR. CX.). An oxidation product of Hydrastine, is allied to Cotarnine. It is probably the active constituent of the drug.

In pale citron yellow crystals, ***soluble*** 1 in 1 of Water (with blue fluorescence when considerably diluted). M.pt. 212° C.—confirmed by D. B. Dott, P.J. ii./22,607; i./23,10. M.pt. of the base is 116 to 117°.—*ibid.* Has been used for internal hæmorrhage hypodermically. Useful in menorrhagia and dysmenorrhœa.

℗ **Sterules, Hypodermic of Hydrastinine Hydrochloride** contain $\frac{1}{4}$ grain.

Purulent ophthalmia neonatorum has been treated by a lotion containing 1% with 1·0% Morphine Sulphate.

℗**Tinctura Hydrastis** (*Off.*).

Dose.—30 to 60 minims (**2 to 4 Cc.**).

Prepared 10% of the Liquid Extract which is standardised.

Fr. Cx.—1 in 5 of the root by weight. Not standardised.

Flavoring.—As Extractum Hydrastis Liquidum *q.v.*

℗**Liquor Sedans.** *Dose.*—½ to 1 drachm (**2 to 4 Cc.**).

A specialty said to contain in 1 ounce Hydrastis (represented by white alkaloid Hydrastine) 60 grains; Black Haw (*Viburnum Prunifolium*) 60 grains; Jamaica Dogwood 30 grains; with aromatics. To restrain nervous irritability and as ovarian and uterine anodyne.

HYDROGENII PEROXIDI LIQUOR.

$H_2O_2 = 34·016$.

Syn. **Aqua Hydrogenii Dioxidi, U.S. VIII. Soluté officinale d' Eau Oxygénée.** Fr. Cx. 12 vol. 'Hydroxyl.'

Dose.—½ to 2 drachms (**2 to 8 Cc.**).

May be prepared by the action of diluted mineral acid (especially sulphuric acid) on barium peroxide in presence of water.

Electrolytic method of making by treatment of Sulphuric Acid in the presence of Hydrochloric Acid or Hydrofluoric Acid. $H_2S_2O_8$ (Persulphuric Acid is first made).—P.J. i./16,3.

Method of making, using Phosphoric Acid and Barium Peroxide, also by passing steam through a mixture of Potassium Persulphate and Sulphuric Acid.—German Patents.—P.J. i./15,656.

The *Official* 'ten volume' Liquor yields 'ten volumes' of available oxygen when decomposed—*i.e.*, 1 Cc. will evolve 10 Cc. of oxygen, or 1·45% of its weight=3·04% by weight H_2O_2. It has the second atom of oxygen in a very loose state of combination. Twenty volume strength is also available in commerce.

Hydrogen Peroxide is produced naturally in many ways, as by the oxidation of oil of turpentine, oil of eucalyptus, &c. It is contained in 'Sanitas,' *q.v.* The solution is used for bleaching ladies' hair. It has a harsh bitter taste.

Incompatibility.—It readily decomposes, especially in contact with metallic oxide, such as that of silver or manganese, these if moist and freshly precipitated cause oxygen to be briskly evolved from it. Ether restrains this decomposition, and is used for making Ozonic Ether.

Further incompatibilities are Alkalis, Ammonia, Arsenous Salts, Carbolic Acid, Glycerin, Hypophosphites, Iodides, Mercurous Salts, Potassium Bromide, Chlorinated Soda and Chlorine Water.

For Assay and Preservation, see Vol. II.

Uses.—Internally is non-poisonous and has been given for pertussis, flatulent dyspepsia and other affections, but now it is mostly employed locally. It is useful for assisting in removing

surgical dressings which adhere obstinately. It is valuable, used *undiluted*, as a pigment or spray for diphtheria, tonsillitis, laryngeal tuberculosis, stomatitis, putrid bronchitis and non-syphilitic ozæna. For tuberculous and syphilitic ulcers, gangrene, malignant pustule and for purulent discharges it is antiseptic. It is astringent, *e.g.*, in epistaxis, and styptic in removing polypi. Does not precipitate albumin. May be used locally for inoperable uterine cancer, chilblains, lupus, favus and other skin affections, also in gonorrhœa (up to 10 volume strength) occasionally. Wasp and hornet stings are at once relieved.

Guttæ. Otorrhœa and otitis may be treated with the 10 volume solution preferably diluted with equal volume of water, but may be used stronger, *e.g.*, of the official strength. After syringing out with weak boric acid lotion, allow to remain in 15 minutes, syringe out again, and dry carefully.

Diphtheritic conjunctivitis is treated with a 10% dilution of the official Liquor. Empyemal cavities have been washed out with diluted solutions, but danger has arisen from embolism by the oxygen evolved. Also employed well diluted in erysipelas, and as an enema in dysentery.

Hay fever is treated by spray of Hydrogen Peroxide into the nose and on the conjunctiva proved efficacious.

Purulent conjunctivitis (gonorrhœal and membranous) is treated with 10 volume Hydrogen Peroxide. In the former case used as warm douche (104° F.) destroys gonococci. Will reduce corneal opacity.

In fistula in cleaning up unhealthy germinating areas and blind pockets, Hydrogen Peroxide is invaluable—on no account should Silver Nitrate be used for this.

Good deodorant to clear a cavity or surface wound but not satisfactory as a wet dressing on gauze. The under layers become clogged and non-absorbent. Its mechanical effect is practically its only recommendation as a lotion for dressing—Casualty Clearing Station experiences.—A. Don, B.M.J. i./16,648.

Neutralising Hydrogen Peroxide Solution with Calcium Carbonate and filtering is said to obviate the pain caused by syringing wounds in the ear with the ordinary acid preparation. This, of course, must be done only at the time of use as the solution would thus rapidly lose its strength.—H. Finnemore, P.J. i./14,421.

Gargarisma Hydrogenii Peroxidi

Hydrogen Peroxide Solution 1 drachm, Sodium Chloride 5 grains, Glycerin 30 minims, Water to 1 ounce. (*Caution.—In a strong bottle.*)

Collutorium Hydrogenii Peroxidi.

Hydrogen Peroxide Mouth Wash.—*Martindale* ('10 volume').

Hydrogen Peroxide Solution (20 volume) 500, Oil of Peppermint 1, Saccharin Elixir 30, Thymol Water 470.

Astringent Hydrogen Peroxide Mouth Wash.—*Martindale.*

The above with 5% of Solution of Aluminium Acetate added makes a useful astringent antiseptic mouth-wash.

As a mouth-wash dilute either of the above with 7 parts of water.

We conducted a number of experiments using Krameria and other ingredients, but the above are the most satisfactory.

For painful ulcers of the mouth in syphilis either of these preparations is suitable—if necessary use stronger, *e.g.*, 1 to 4.

Lotio Salox V.H.C.

Hydrogen Peroxide Solution (20 vol.) 907, Sodium Chloride 85, Boric Acid 12. For use add one part to 4 of water.

Unguentum Hydrogenii Peroxidi.

Hydrogen Peroxide Solution 10 (or less as ordered), Anhydrous Wool Fat to 100. Useful in eczema and other parasitic skin affections. Should be freshly made.

Dental Use.—The 20-volume strength can be used for acute or chronic periodontitis and gouty periodontitis by syringing out pockets around affected teeth after removing any calculous or other matter. May also be used for septic root canals.

Ozonic Ether.

Dose.—½ to 1 drachm (**2 to 4 Cc.**).

A solution of about 1·2% by weight of H_2O_2 in ether (*i.e.*, 4 volumes approximately). It is ***Soluble*** in water in all proportions up to three times its volume, possesses properties similar to the above, and is more stable. In conjunction with Tincture of Guaiacum, it is employed as a test for blood, *v. Vol. II.* Has been given internally for diabetes and whooping-cough, and has been used locally for scarlet fever.

For bleaching teeth which have become discoloured from death of the pulp, etc.

Hydrogenii Peroxidum Boratum.—Borated Hydrogen Peroxide.

Neutralise carefully (using Phenolphthalein as indicator) any desired quantity of Hydrogen Peroxide (previously examined to ensure correct) with caustic soda. Then add 3% boric acid. The preparation is permanent, within reasonable limits.

Liberates oxygen on coming in contact with blood or other organic matter. A useful mouthwash.

Loss of sense of smell returned (to our knowledge), after the use of this preparation as a nasal lotion.

Magnesii Peroxidum.

Dose.—15 to 60 grains (**1 to 4 Gm.**).

A white tasteless powder insoluble in water, containing about 20% of Magnesium Peroxide, $MgO_2 = 56{\cdot}32$, with Magnesium Oxide, and is for use where increased oxidation is desired: given for weak digestion, anæmia, and in diarrhœa of phthisis, vomiting, anorexia, flatulence and pyrosis.

5 to 10% added to precipitated or prepared chalk powder makes a good dentifrice. **Tablets** contain 0·3 Gm.

Tablets and 'Stearettes' of Magnesium Peroxide, 3 grains each are prepared.

Zinci Peroxidum. Fr. Cx. Supp. II. *Syn.* Ektogan, Dermogen.

$ZnO_2 = 97{\cdot}37$.

A white powder insoluble in water. Used locally in skin affections.

Promotes healing of chronic ulcers. For burns and wounds.

Incompatible with Corrosive Sublimate. 10% **Unguentum** or dusting powder is used.

Sodii Peroxidum, Sodium Dioxide, F.E. $Na_2O_2 = 78{\cdot}0$.

A yellowish white amorphous deliquescent powder, dissolves in water with production of heat and evolution of oxygen.

50%. Solution has been used in dentistry to whiten stained teeth.

Technically used as bleach for sponges, wool, bones, oils, etc.

Unguentum Sodii Peroxidi. 20% in soft white paraffin may be tried with caution in acne.

Cubes of Sodium Peroxide. *Syn.* OXYLITH, "SOLID OXYGEN."

Have been used for generating oxygen.

ℙ1 HYOSCINA.

$C_{17}H_{21}NO_4$=303·261 (+Aq.).

A thick syrupy alkaloid, contained in *Hyoscyamus niger*, different species of *Scopola*, *Datura alba*, the flowers of which yield 0·5%, and other solanaceous plants.

It may be obtained from the Mother liquors of the preparation of Hyoscyamine. It is chemically and physiologically equal to Scopolamine. *Atropa Belladonna* apparently contains small quantities of Scopolamine. For the purposes of the Poisons and Pharmacy Act, 1908, we consider hyoscine as a 'belladonna alkaloid.'

For further details of the chemistry of this and allied alkaloids, Thorpe should be consulted. See also Lævo-Scopolamine, p. 489.

Uses.—Hyoscine is a powerful narcotic, especially useful in cases of insomnia, in calming excitement and delirium and producing sleep in acute mania. In such cases even double doses may be given. It is said to have no influence on the respiration, but to increase the action of the heart and circulation. As little as $\frac{1}{480}$ grain dilates the pupil in 18 minutes The mydriasis is brief. It does not cause dryness of throat. Should be avoided in acute glaucoma.

It is considerably employed as an adjunct to, or substitute for ordinary anæsthetics in cases in which either light anæsthesia is required, or those in which the anæsthesia is 'likely to be prolonged and it is desired to restrict the ordinary anæsthetics as much as possible.'—B.M.J. ii./10,1451—being used largely in conjunction with Morphine in relieving the pains of labour. See p. 490 *et seq.*

Hyoscine relieves chorea, asthmatic attacks, pertussis and paralysis agitans, and the tremor of alcoholic excess. It has been given in vomiting of pregnancy.

In treatment of morphine and cocaine habits it has been used, but apparently not without danger.

Nocturnal spermatorrhœa is checked by $\frac{1}{200}$ grain doses in Chloroform Water by the mouth —W. W. W.

In the treatment of diathermasia (thermal stroke in the tropics) Quinine is of no use if malaria has been excluded. Strychnine should be avoided. The patient should be placed in an ice pad, and a hypodermic injection of $\frac{1}{75}$th grain of Hyoscine Hydrobromide should be given to quiet the intense cerebral hyperactivity. For thready pulse $\frac{1}{100}$ grain Digitalin is useful. After diaphoresis small doses of Ammonium Bromide may be given.—Brooke.

As hypnotic not advised in cases other than maniacal as its action is uncertain. In puerperal mania $\frac{1}{150}$ to $\frac{1}{50}$ grain may be given *by the mouth.* To quell mania dose of $\frac{1}{100}$ grain hypodermically has proved useful. Kidney disease and feeble state of heart do not contra-indicate its use. In paralysis agitans $\frac{1}{250}$ grain removes

tremor.—Pr. Nov. 10,733. On discontinuing the medicine, however, those symptoms return, and again it often fails.—W. W. W.

In septic pneumonia and influenza may be cautiously given for sleeplessness.—Sir J. Moore, Pr. January, 1919.

In acute mania the following heavy doses are tolerated :—Chloral Hydrate 45 grains, Potassium Bromide 30 grains, Hyoscine Hydrobromide 1/40th grain in water to one ounce when required. (*Caution* —heavy dose). After a few doses the medicine may cease to have effect even when the Hyoscine is increased to 1/20th of a grain. A hypodermic injection (10 minims of a $\frac{1}{4}$ per cent. solution) of Hyoscine will, however, often subdue.—B.C.D. i./13,630.

Hyoscine possesses about 5 times the calmative power of atropine or hyoscyamine.

In locomotor ataxy Hyoscine Hydrobromide $\frac{1}{250}$ grain in Chloroform Water thrice daily.—Pres. Mar. 1911, p. 281.

Complete anæsthesia effected by $\frac{1}{40}$ grain in two blacks in Rhodesia.—Regarded as a maximum dose.—L. ii./10,884.

Hyoscine 1/150 grain, Morphine 1/3 grain. Anæsthetic for the Alcohol injection (*q.v.*) treatment of neuralgia. Give 20 minutes prior to the Alcohol.—W. Harris, L. i./13,881.

Delirium tremens. Hyoscine 1/50 grain with Morphine 1/3 grain. A sheet anchor, but may be cumulative.—W. Starkey, B.M.J. i./20,47. (*Caution* : 1/50 grain is a big dose.—W.H.M.).

Antidotes.—Pilocarpine or Caffeine should be administered, also Tannin and Tea, after Emetics and use of stomach pump.

Hyoscine poisoning in a five-year-old boy. The child had eaten several tablets, each containing $\frac{1}{100}$ grain of Hyoscine Hydrobromide, and was unconscious when the doctor arrived. An injection of $\frac{1}{4}$ grain of Pilocarpine Hydrochloride improved the condition of the boy within ten minutes, and next morning a complete recovery resulted.—L. ii./10,884. *See also Vol. II.*

℞ **Oleum Hyoscinæ,** 1% in Castor Oil. Causes a mydriasis which is certain, quick in onset and of transient effect. ℞ **Unguentum Hyoscinæ,** R.O.H. Hyoscine base $\frac{1}{2}$, Soft Paraffin 100.

℞ **Hyoscinæ Hydrobromidum** *Syn.* **Scopolaminæ Hydrobromidum, U.S., Ph. Ned.** P. Jap. $C_{17}H_{21}NO_4.HBr.3H_2O$.

In white rhombic crystals, soluble 1 in 4 of water (or less), 1 in 14 of alcohol. Melts at 190° to 192° C. U.S. *Dose.*—$\frac{1}{200}$ to $\frac{1}{100}$ grain (**0·0003** to **0·0006 Gm.**), increased to $\frac{1}{50}$ grain. P.G. has maximum single dose 0·0005 Gm., maximum *pro die* 0·0015 Gm.

N.B.—As initial dose we advise $\frac{1}{400}$ or $\frac{1}{300}$ grain. Patients vary in reaction to this drug.

The pure salt (water free) has, according to Schmidt, O.R. for a 6·5% solution at 15·8° C. $[a]_D = -25°\ 45'$ Commercial Hyoscine Hydrobromide though often less lævo-rotatory than this owing to presence of dextro or racemic scopolamine, according to Schmidt does not differ markedly in physiological effect from that of pure **Lævo-Scopolamine.**

P.G.V. requires a 5% aqueous solution, calculated as anhydrous salt, to have a rotation : $[a]_D$ at $15° = -24°\ 45'$. On adding 1 drop of potassium, permanganate solution (0·1%) to 5 Cc. of a 1% aqueous solution, the red colour should not disappear within 5 minutes (apoatropine).

Jowett thought that as both Lævo- and optically inactive Scopolamine occur in the plant, preparations may vary according to slight differences in ways of making.—P.J. i./13,401.

Resolution of Hyoscine and its components Tropic Acid and Oscine. There are possible four isomeric hyoscines.—H. King, C.D. '19,348.

Lævo-Scopolamine is stated to act on the vagus three to four times, and on the oculo-motor nerve almost twice as strongly as *i*-scopolamine. An aqueous solution of the former does not lose its activity on keeping.—E. Hug (Arch. exp. Path. Pharm., 1912,69,45), J.C.S.A. ii./12,791. See also H. Finnemore, P.J. ii./12,136.

℞ **Guttæ Hyoscinæ, R.O.H.,** 0·5%.

℞ **Lamellæ** for ophthalmic use contain $\frac{1}{500}$ (R.O.H.) and $\frac{1}{200}$ grain.

℞ **Guttæ Hyoscinæ et Cocainæ, St. Thos. H.**
Hyoscine Hydrobromide 0·5, Cocaine Hydrochloride 1·0%.

℞ **Injectio Hyoscinæ Hypodermica.** 1 grain in 1,000 minims.
Dose.—5 to 10 minims.

℞ **Liquor Hyoscinæ Hydrobromidi,** 1 in 1,000 of chloroform water.
Dose per os—3 to 15 minims (**0·2 to 1 Cc.**).

Scopolamine Hydrobromide solutions stated to keep better by addition of a large amount of a polyhydric alcohol, *e.g.*, *Mannite.* Thus Scopolamine Hydrobromide 0·2 Gm., Mannite 100 Gm., Distilled Water to 1 litre. The solution to be sterilised.—P.J. i./15,299. The authors have never had the slightest complaint of this liquor made with chloroform water.

℞ **Pilula Hyoscinæ Hydrobromidi,** $\frac{1}{400}$ to $\frac{1}{150}$ grain.

℞ **Hypodermic Tablets,** $\frac{1}{400}$, $\frac{1}{200}$, $\frac{1}{100}$ and $\frac{1}{75}$ grain in each.

Severe poisonous effects from $\frac{1}{12}$ grain.—L. i./04,24.

For general ***uses*** and References to Hyoscine Salts *vide* Hyoscine *antea.*

Scopolamine-Morphine Anæsthesia.

Scopolamine Hydrobromide $\frac{1}{200}$ to $\frac{1}{64}$ grain or more, and a salt of Morphine $\frac{1}{7}$ to $\frac{1}{2}$ grain are injected on the evening before the operation, and a similar or higher dose in the morning before the operation. This alone may suffice to produce deep sleep. If not, ether or chloroform may be given until complete anæsthesia occurs. Patients sleep for hours through the first painful periods after the operation.

One of the physiological effects of Scopolamine is to induce temporary loss of memory. This is made use of in the **"Twilight Sleep"** method of inducing child-birth.

The only successful method of inducing "Twilight Sleep" is to give doses according to the needs of the hour. Hypodermic injection of Morphine $\frac{1}{6}$ to $\frac{1}{4}$ grain most commonly used. First dose of Scopolamine 1/150 grain; at the end of one hour a second injection of 1/450 grain is given—this latter amount is injected at intervals (about every hour) controlled by the patient's condition. The number of the Scopolamine injections matters little. *The Morphine must not be repeated.* One of the most gratifying features is the marked absence of maternal shock afterwards. Patients do not complain. The child is usually born with a shallow respiration, but artificial respiration will improve breathing. A little Chloroform administered by the Junker Apparatus used in the late second stage, and when the head appears give $\frac{1}{4}$ or $\frac{1}{2}$ Cc. of Pituitary Extract.—A. W. Bourne, Clin. Jl., Dec. 19/23,601.

Scopolamine-Morphine-Atropine Methods :—

Morphine $\frac{1}{6}$ grain with Scopolamine, $\frac{1}{100}$ grain has been given the night before operation, after thoroughly emptying the bowel, and

next morning after a rectal enema a further dose of the same quantity, and an hour before operation, *Atropine $\frac{1}{100}$ grain with Strychnine $\frac{1}{30}$ grain* is given subcutaneously. Less Chloroform is needed. Used in the most serious abdominal and pelvic operations.—L. i./11,737; B.M.J. i./11,757.

Dudley Buxton is of opinion that Atropine is an essential when 'open Ether' is used, as although Scopolamine produces similar effects yet when combined with Morphine its action in that direction is insufficient to counteract the injurious results of unstinted doses of Ether.—L. i./11,737.

Patients usually pass into profound sleep when the operation is finished, hence need watching for some hours, indeed until the narcotic effects have passed off. As the respirations are slow and shallow, time must elapse for the action of the drugs to pass off. The stupor need not alarm if breathing is regular and adequate and albuminuria or glycosuria are known not to be present.—B.M.J. ii./11,1150.

℞℗ **Sterules and Tablets, Hypodermic for Scopolamine-Morphine Anæsthesia** contain Scopolamine Hydrobromide $\frac{1}{100}$ grain with Morphine Hydrochloride $\frac{1}{6}$ grain in 10 minims.

℗ **Sterules of Atropine Sulphate** $\frac{1}{100}$ grain with **Strychnine Sulphate** $\frac{1}{30}$ grain in 10 minims are for use with these as above mentioned. They are also made with $\frac{1}{60}$ grain of strychnine sulphate.

℞℗ **Compound Scopolamine (Hyoscine) Sterules** contain Scopolamine $\frac{1}{120}$ grain and Morphine $\frac{1}{8}$ grain with Atropine Sulphate $\frac{1}{120}$ grain in 5 minims of water.

℞℗ **Compound Scopolamine (Hyoscine) Tablets** contain the same ingredients as the last.

So long as complete amnesia and not analgesia is aimed at and maintained there is no risk to either mother or infant. If pushed to the slightly further stage of analgesia the risk may be grave. Remarkable absence of exhaustion and shock upon the mother.—W. O. Greenwood, B.M.J. i./17,355.

Stovaine intraspinally 0·5 to 0·7 Cc. of 10% solution combined with twilight sleep in gynæcology.—F. L. Provis, L. i./18,152.

Twilight Sleep not free from danger. Consensus of views.—G. Blacker. L. i./18,430. See also B.M.J.E. i./15 11; ii./15,3.

Crile's Anoci-Association *i.e.*, the exclusion of all harmful associations or stimuli. Scopolamine Morphine employed also Novocain Infiltration with Solution 1 in 400. In abdominal work Quinine Hydrochloride and Urea 5% of each in Normal Saline.—H. B. Butler and E. W. Sheaf, B.M.J. ii./14,113.

Morphine alone, 1/6th grain hypodermically, repeated at various intervals throughout labour, satisfactory. The progress of the labour was found to be hurried rather than delayed.—Louise McIlroy, B.M.J. i./21,159. Endangers child's life when given repeatedly up to shortly before birth.—H. Spencer—*ibid*, 159.

In the Morphine-Scopolamine Method the child was born in 3% of cases oligopnœic—of a blue colour with very shallow breathing. In each case it recovered spontaneously—Morphine not necessarily the cause.—F. W. N. Haultain, B.M.J. i./21,341.

Specially indicated in primiparæ (experience of 140 cases). Chloroform only to be given at the very end of the second stage. Postpartum hæmorrhage not more frequent than usual.—N. Hirschman, B.M.J. ii./22,669.

Main objection is the effect on the child, vigilance necessary. Notes on 75 cases. Scopolamine 1/150 grain and Morphine 1/3 grain; the former repeated in an hour. Results generally good.—H. M. Gerson, L. i./22,428.

℗ **Scopolamine Hydrochloride** $(+2H_2O)$ and ℗ **Hydriodide** have properties and doses analogous to the Hydrobromide.

HYOSCYAMI FOLIA.

JUSQUIAME.—FR. CX.

Henbane Leaves consist of the fresh leaves; also the leaves and flowering tops separated from the branches and carefully dried. Collected from the flowering plants.—*Off.* not standardised, *cf.* U.S., etc., *infra.* The *Off.* leaves now conform with F.I.

Cultivation.—For details see Vol. II.

Uses.—Similar to those of belladonna and stramonium.

Colocynth and other strong purgatives in pills are rendered less painful in action by addition of Hyoscyamus Extract.

Hyoscyamus (Tincture) contains varying amounts and proportions of Hyoscyamine and Atropine and a varying amount of lævo and inactive scopolamine. The physiological activity of stereoisomerides varies.—H. A. D. Jowett, P.J. i./13,401.

U.S. directs leaves and flowering tops (second year's growth) yielding not less than 0·065% alkaloids. **P. Helv.** required 0·1%.

℞ **Extractum Hyoscyami** (*Off.*).

Dose.—2 to 8 grains (**0·12 to 0·5 Gm.**).

This is now totally different from **Extractum Hyoscyami Viride**, B.P. '98. It is an alcoholic extract of the leaf, made with 70% Alcohol and conforming with F.I., and is standardised (*Off.*) to 0·3% alkaloids. U.S. IX. has 0·25%. Glucose is used as diluent.

℗ **Tinctura Hyoscyami** (*Off.*).

Dose.—½ to 1 drachm (**2 to 4 Cc.**). Powdered Hyoscyamus leaves 1 in Alcohol 70% to 10. This conforms with F.I.

Flavoring.—Syl Aurantii Amari, Syl Vanillæ; Syrupus Aurantii Floris.

Frequently the pain due to pyelitis may to some extent be controlled by Hyoscyamus Tincture in doses of ½—1 drachm.—Tirard Med. Treatment.

Baume Tranquille. FR. CX. (Huile de Jusquiaume Composée). Macerate powdered leaves of Belladonna, Hyoscyamus, Solanum Nigrum, Poppy and Stramonium of each 50, with alcohol 200, and allow to stand 24 hours then add Poppy Seed Olive Oil 5000, warm for 6 hours at 60 to 70°C. Press and allow to deposit, and finally add Oils of Lavender, Peppermint, Rosemary and Thyme of each 1 and filter.

℗ **Fluidextractum Hyoscyami, U.S.** *Average dose.*—3 minims (**0·2 Cc.**). Strength 1=1; hydro-alcoholic percolate, standardised to 0·065% hyoscyamus alkaloids.

The dried leaves are said to contain as much as 0·25% of total alkaloid of which ¼ to ¾ may be Hyoscyamine. The minute dark grey seeds of the plant contain 0·5% alkaloid, also a quantity of oil.

FR. CX. employs the seeds for making ℞ Pilules de Cynoglosse opiacées.

Hyoscyamine is also contained in *Atropa Belladonna, Duboisia myoporoides, Datura Stramonium, Scopola Carniolica, S. Japonica,* and other atropaceous plants.

Hyoscyamus muticus. **Egyptian Henbane** has been found to contain 0·91% Alkaloids by titration. Costs less than 1/20 of the medicinal drug. Has been imported in America and diluted with inferior henbane, as it contains 1 to 1·25% Hyoscyamine. It grows wild all over Egypt, where it is known by the name of 'Sakran,' the drunken. The alkaloid it contains is practically pure Hyoscyamine.

It is now a drug of extreme importance as a source of Atropine—the hyoscyamine contained is easily converted into Atropine,—*vide* Hyoscyamine *infra*. The Germans had the astuteness to corner supplies in Egypt and sell the Atropine to us at fancy prices.—The late Gordon Sharp, P.J. ii./17,108.

This lævo- Hyoscyamine has been suggested to replace Atropine for ophthalmic work—*vide* Atropine.

Ⓟ **Meglin's Pills**.—Hyoscyamus Extract, Valerian Extract, and Zinc Oxide each 1 grain.—In sciatica.

Lactucarium, U.S. *Average dose.*—15 grains (**1 Gm.**).

The concrete milk juice of *Lactuca virosa* (*Compositæ*), the strong scented lettuce. Hyoscyamine is said to be a constituent of the fresh plant. Brownish masses with opium-like odour and bitter taste, partly soluble in alcohol and in ether. **Tinctura Lactucarii, U.S** 1 in 2. *Average dose.*—30 minims. **Syrupus Lactucarii U.S.** (1 in 20). Tincture of Lactucarium, 100, Glycerin 200, Citric Acid 1, Orange Flower Water 50, Syrup to 1,000. *Average dose*—2 drachms for insomnia

The Iron content of lettuce is said to vary from 0·00972% to 0·00033%, the variety richest in Iron content being "May King," and the poorest, the Cos Lettuce. Description of estimation.—A. Lichtin, per P.J. i./23,358.

ℙ1 HYOSCYAMINA.

$C_{17}H_{23}NO_3 = 289·277$.

Dose.—$\frac{1}{200}$ to $\frac{1}{100}$ grain (**0·0003 to 0·0006 Gm.**), in cases of mania increased to $\frac{1}{16}$ or $\frac{1}{8}$ grain dissolved in water by means of diluted sulphuric acid, or in a pill. ***Antidotes.*** *See* Atropine.

An alkaloid obtained from *Hyoscyamus niger* and other Solanaceous plants. It is a stereo-isomer of Atropine (which is inactive), into which it can be converted by heating or acting upon it with alkali. It is in light snow-white crystals. O.R. of Solutions of Hyoscyamine is $[a]_D = -20·97°$.

Soluble 1 in 120 of water, freely in alcohol, chloroform and ether. Is alkaline in reaction, and melts at 108°—109° C.

It has been found in *Scopola Japonica*—*q.v.*

ℙ1 **Hyoscyaminæ Hydrobromidum,** $C_{17}H_{23}NO_3HBr = 370·205$.

Dose.—$\frac{1}{200}$ to $\frac{1}{100}$ grain (**0·0003 to 0·0006 Gm.**), increased.

In small white crystals, soluble about 2 in 1 water.

Does not yield precipitate with platinic chloride (difference from most alkaloids) U.S. M.pt. 152°C.

ℙ1 **Hyoscyaminæ Sulphas.** (*Off.*).

$(C_{17}H_{23}NO_3)_2H_2SO_4,2H_2O = 712·662$.

Dose.—$\frac{1}{200}$ to $\frac{1}{100}$ grain (**0·0003 to 0·0006 Gm.**).

In small white granular deliquescent crystals, soluble in water 2 in 1 and about 1 in 4 of alcohol 90%.

ℙ1 **Hypodermic Tablets of Hyoscyamine Sulphate** contain $\frac{1}{100}$ and $\frac{1}{50}$ grain. ℙ1 **Ophthalmic Discs** contain $\frac{1}{3000}$ grain.

Guttæ Hyoscyaminæ (*vel* **Daturinæ**) **R.O.H.** 0·25%.

ℙ1 **Granules** of **Hyoscyamine** $\frac{1}{100}$ grain (**0·0006 Gm.**) are used for sea-sickness. *Dose*, occasionally a day or so beforehand, and for the first few days on board; hourly if required.

Uses.—As a mydriatic it acts like atropine, but with greater intensity, while the duration of effect is about equal.

It removes the pain of neuralgia and is given for mental excitement, *e.g.*, delirium tremens. In mania $\frac{1}{8}$ grain may be given hypodermically.

Criminology.—Suggested use of hyoscyamine to extract 'the truth' from unwilling deponents. Could not be used in this country.—L. ii./22,1191.

℗ **Duboisine** from the leaves of *Duboisia myoporoides* is identical chemically with, and physiologically similar to Hyoscyamine. It is in amorphous very hygroscopic granules.

ICHTHOSULPHOL.

***Ichthyol (F. Ital.).** Trade Marks.—See 39599 (Class 2) and 39600 (Class 3), (Names and Designs). 59155, 6 and 7 (Classes 2, 3 and 48 respectively). ***Ichthyolate,** No. 64841, and ***Ichthyolicum** 64842.

Syn. *Saurolo (T.M. 324693). Ammonium Sulpho-Ichthyolate. (**P. Belg. P. Jap.**) Patents 10,523/1884 and 6044/1893 ***Expired.***

Dose.—10 to 30 grains (**0·6 to 2 Gm.**) per diem.

A viscous, brownish substance, with a disagreeable odour obtained by destructive distillation of a fossil fish deposits, and treating the basic oil thus made with sulphuric acid and neutralizing with ammonia.

According to a partial analysis the total Sulphur is 10·3% of which 8·92 is organically combined and 1·38 is in association with Ammonia. Total Ammonia 3·23%; 43·74% water.—L. i./13,328. Other refs. in last Edn.

Soluble in water, glycerin, ether, fats, oils, and partially in alcohol 90%.

Uses.—Internally has been given for rheumatism and skin affections, and as an intestinal antiseptic in constipation and dyspepsia. Reduces expectoration and cough in phthisis; also stated to be useful in whooping-cough. Externally it is used in chronic skin diseases, as eczema, psoriasis, acne, and favus. The odour may be disguised with Oil of Citronella, which is itself used in Ceylon for rheumatism. Applied on wool as vaginal tampon, and as pessaries and suppositories, and as injections 2 to 5% (Lock Hosp.) in gonorrhœa, cystitis and vaginal discharges. Also applied to cracked nipples and erysipelas. For prurigo senilis a 30% solution in water is recommended; for pruritus and ulcers a 10% solution; may be combined with preparations of lead and mercury without the formation of sulphides. For burns it has been used diluted with zinc oxide or bismuth (the powder being spread evenly over the surface), or in ointment (10 to 50%). In mumps the swelling and pain are said to be rapidly relieved by inunctions of equal parts of Ichthyol and Lanolin. Wounds in war have been treated by it in conjunction with glycerin.

Erysipelas in a large suppurating wound on the arm well treated by painting with Ichthyol and Glycerin *p. aeq.* covered with oiled silk. Simultaneously a mixture containing 2 drachms of Liquor Hydrarg. Perchlor. every four hours. Wound then dressed with hypertonic Saline. Same treatment for a bad case of boils from the trenches also successful.—B.M.J. i./16,201.

Albuminuria is well treated by Ichthyol internally combined with B. Coli. injections.—F. J. Sadler, L. i./22,930.

Lithium and Sodium Sulpho-Ichthyolate. *Dose of either.*—10 to 30 grains (**0·6 to 2 Gm.**) per diem. **Zinci Sulpho-Ichthyolas** is for external use.

Capsules of **Ichthyol** and of **Lithium-Ichthyol,** 4 grains (**0·25 Gm.**) each (or combined 2 grains of each). **Tablets** 2½ grains.

Collodion 7 parts, with Ichthyol 1 part, is used for eczema, erysipelas, and other skin diseases.

Mistura Ichthyol. *Dose.*—1 to 3 drachms in water.

Ichthyol 6, Simple Elixir 20, Water 10. Another form is Ichthyol 2, Peppermint Water 7½, Syrup 2½.

Pilula Ichthyol.

Ichthyol 2½, Compound Tragacanth Powder ½, Liquorice Powder 1½ grains. Make a pill, on hot plate if necessary.

With Lithium and Sodium Ichthyol less Liquorice will suffice.

Pessaries of Ichthyol, 10% strength, with Cacao butter basis are used for leucorrhœa, and 2 to 5% in gonorrhœa of the female. Also made with **Resorcin,** 3%. These must be made with Cacao Butter basis. *See also* **Ovules.**

Suppositories of Ichthyol may contain 3 grains (**0·2 Gm.**) with a basis of Theobroma 12 grains. The mixture must be almost 'set' whilst pouring into the moulds, otherwise may separate. The addition of beeswax is not desirable; indeed a large proportion will render the suppository quite insoluble. May also be made, *if for immediate use,* with **Glyco-gelatin basis.** Do not overheat the mass, or it may become insoluble. (*Physicians should specify which basis they prefer.*)

Unguentum Ichthyol may be made to contain from 20 to 50% with lanolin or with olive oil and lard. For psoriasis and erysipelas and blepharitis (5%). May be perfumed with otto of rose *q.s.*

Ichthyol Resorcin, contains Resorcin 10% for external use.

Ichthyol Paste for acne rosacea. Ichthyol 25, Carbolic Acid 2½. Dissolve in Warm Water 22½, and mix with Starch 50. Painted on the skin, quickly dries and is easily washed off.

Pasta Ichthyol et Olei Terebinthinæ.

Ichthyol 1, Oil of Turpentine 1, mix. Of value in chilblains.

Ichthosulphol Proteinate. ✱**Ichthalbin** (T.M. 223215). *Dose.*—¾ to 15 grains (**0·05 to 1 Gm.**).

According to one of the methods given in the Patent Specification 11,344/1897 now void, a solution of 10 kilos of Ichthosulphol is added to a solution of 10 kilos of Albumen in 60 litres of water. To the mixture a dilution of 900 Gm. Sulphuric Acid in 10 litres of water is added with constant stirring, and the precipitate dried and powdered or washed with spirit. We tried this and found it to give satisfaction. The washing with alcohol is an advantage.

A combination of ichthyol and albumen, ; an odourless and tasteless brown powder. Used internally for eczema, nervous intestinal affections and during convalescence from fevers.

Ichthyol Salicyl is a powder made with either 25, 33⅓ or 50% of sodium salicylate for psoriasis, acne rosacea and for rheumatic pains, and has been given internally in pills for tuberculosis.

***Ichthoform** (T.M. 222252, Class 2, and 222253, Class 3).
PATENT 9157/1899 lapsed in 1907.
Manufacture.—We have found the following satisfactory:
Mix Ichthyolsulphonic Acid 200 Gm. with water 400 Cc. and add Formalin (40%) 25 Gm. Heat 10 hours on the water bath. Collect the precipitate, wash and dry at 100° C. A compound of Ichthyol and Formaldehyde, insoluble in water. Intestinal Antiseptic, *e.g.*, in tubercular diseases. *Dose.*—1½ to 5 grains (**0·1 to 0·3 Gm.**).
***Thigenol** (T.M. 260287) is similar but a sodium salt; a 5% ointment relieves eczema. Thigenol Soap contains 10%.
***Sphagnol** (T.M. 246705).—A native tar product produced from peaty deposits. In blepharitis, eczema, piles, sores and burns. Detergent and relieves insect bites in tropical countries. **Ointment** (10%), **Medical Soap** (15%), **Toilet Soap** (5%), and Shaving Soap 5%, and **Suppositories**, 3 grains for piles, are made.

INFUSA CONCENTRATA.

These preparations are made of such strength that one volume diluted with 7 of water approximately represent the official Infusions. Farr and Wright recommended dilute Chloroform Water (Chloroform 1 in Water 1,000) either (*a*) by **Macero-Expression** in which the amount of drug required per pint is macerated in 15 ounces of the menstruum in a closed vessel for 24 hours, strained, pressed, and the alcohol or tincture necessary then added and maceration repeated two or three times. The two latter liquors are evaporated and added to the first and made up to one pint. The third maceration may be omitted when dilute alcohol is used as menstruum, and for the second maceration only *q.s.* need be used to make the expressed liquids when mixed measure one pint. The dilute chloroform water is to be used to prepare diluted alcohol when this is employed as menstruum. (*b*) By **Repercolation** consisting in moistening half the drug with menstruum and percolating. The other half is then moistened and percolated with the first percolate—percolation being continued in a second percolator until 13 ounces (reckoned on pint formula) are obtained. Add the alcohol and any tincture, etc., in the formula and reserve. Complete the exhaustion. The weak liquors are evaporated and added to the reserved portion. The bulk is then made up to volume (1 pint).

When using diluted alcohol as menstruum simply percolate until 1 pint of percolate has been collected from the second percolator. This is the easier procedure. By whichever process they are made concentrated infusions must, to keep, *contain at least* 20% (*for export* 25%) alcohol.—W. H. M. 1% of Formalin Solution is also used as preservative, but Alcohol is better.

Broom, by (*b*),but not very satisfactory. **Buchu,** by (*a*) using dilute alcohol and add tincture 1 ounce to each pint. Diluted, however, not equal to the fresh article. **Calumba,** by (*a*) heating finally to 85° C. for 5 minutes. **Cascarilla** by (*a*) adding 6 dr. (B.P.C. 12 dr.) tincture to a pint. Diluted as good as infusion. **Chamomile** (*b*), dilute with alcohol, adding 1 drop of oil for each ounce of flowers used. **Chiretta** (*b*), satisfactory. **Clove,** not satisfactory. **Cusparia** (*a*), good. Ⓟ**Digitalis** (*a*), will not keep more than one month —B.P.C. **Gentian Compound** (*a*), adding 2 drachms of orange and lemon tinctures to the pint. **Hops** (*a*), with alcohol. Use old hops. **Orange** (*b*), adding tincture 1 ounce. **Orange Compound** (*a*), adding 1 ounce orange and

lemon tinctures **Quassia** (*b*). **Rhatany** (*a*), if with alcohol more body, but not like official article. **Rhubarb** (*b*). **Roses** (*b*), with acidulated alcohol. **Senega** (*b*), with alcohol and a little ammonia. A little wintergreen oil to be added to finished product. Deposits in time. **Senna** (*a*), with alcohol and add essence of ginger ½ ounce to pint. Diluted is as good as the fresh infusion. **Serpentary** (*b*). **Valerian** (*b*), with addition of ammonia (B.P.C. uses 0·3% strong solution). Diluted, is superior to the fresh infusion.—P.J. i./06,163; C.D. i./06,252. Yields of extractive.—P.J. i./05,435. **Infusum Cinchonæ Acidum** (*Off.*, and B.P. 1898). Cannot be produced in a concentrated form.

These remarks apply equally to the *Off.* Infusions, but Cusparia, Hops and Serpentary are now omitted.

Some experiments comparing concentrated Infusions diluted "1 to 7" with fresh Infusions showed clear advantage of the latter in general properties. The use of the concentrated preparations is unwarrantable.—Thomas Stephenson. P.J. i./11, 255.

Infusum Quassiæ Concentratum (as injection for threadworms in children) should contain no alcohol.—B.M.J. ii./11,52.

Tisanes.—Infusions or teas (usual strength 1 in 10) of herbs are largely used by the laity in France, Italy, &c. Those mostly in use are:—*Tilleul* from flowers of *Tilia Europea*—Linné. German—*Lindenbluthen* (anti-spasmodic, diaphoretic); Senna and Manna (largely used); *Queues de Cerise*, cherry-stalks diaphoretic); Peppermint; Tamarinds; *Bourrache*, Borage-leaf tea; Chamomile; *Mauve*:—Malva Sylvestris, Marshmallow-flowers (demulcent); *Chiendent* couch-grass (kidney-tonic); Aniseed (both varieties), Linseed; *Orge* (pearl-barley). A large number of other tisanes are prepared.—Ph. Notes, France and Riviera. Several are contained in the Fr. Cx.

They form the basis of domestic therapeutics in France—virtually unknown here.—B.M.J. i./21,60.

IODOFORMUM.

Tri-iodomethane. $CHI_3 = 393{\cdot}763$.

Dose.—½ to 3 grains (**0·03 to 0·2 Gm.**).

Manufacture.—By acting upon Alcohol with Iodine in the presence of Caustic Potash (or Carbonate) solution at about 70° C.

$$(6KOH + 4I_2 + C_2H_5OH = CHI_3 + HCOOK + 5H_2O + 5KI).$$

It is also produced by the electrolysis of an aqueous solution of Potassium Carbonate, Potassium Iodide and Alcohol.

The substance has characteristic odour and contains 96·7% iodine.

The yellow crystals—if minute—will pass through a dredger. A precipitated form is also available.

Antidotes.—Opiates, bromides, diuretics with 5 to 10% of Sodium Bicarbonate locally.

Internally we have known it to be badly tolerated—may bring out a rash or crop of angry spots.

Soluble 1 in 8 of absolute ether, 1 in 10 of ether (Sp. Gr. 0·735), 1 in 12 of chloroform, 1 in 95 of 90% alcohol, 1 in 14 of eucalyptus oil, 1 in 10 of collodion, 1 in 60 of vaseline and oil of almonds, and about 1 in 30 of olive oil. Almost insoluble in water, but dissolves 1 in 10 of Rubini's solution of Camphor, which disguises its odour.

Incompatible with calomel, silver and other nitrates, potassium chlorate, nitrites and methylated spirit.

Iodoformum Aromaticum is scented with Coumarin, 1 in 50.

To cover its odour it may also be mixed with Balsam of Peru, Menthol, Phenol, Thymol, Oils of Anise, Eucalyptus, Geranium, Peppermint, Rosemary or Sassafras, about 1 or 2%.

To remove the smell from the hands, utensils, etc., rub with a little crushed linseed and wash afterwards.

Uses.—Antiseptic, anæsthetic and sedative. Useful in gonorrhœa and syphilis (non-irritant). To sores as dusting powder or ethereal solution. Insufflations (*q.v.*) are used in throat affections. The (10%) ointment is a useful dressing to wounds.

Taken internally, Iodoform decomposes, and iodine is soon found in the urine; being non-irritant has given good results in intestinal hæmorrhage, tertiary syphilis and cirrhosis of the liver, also to kill tapeworm. Tuberculous peritonitis has rapidly recovered under Mercury and Chalk ½ grain with Iodoform ½ grain thrice daily. Excessive administration may produce symptoms like those of exophthalmic goitre in susceptible persons.

Iodoform Oil (20 grains to 1 ounce of Olive Oil) is useful as dressing in early stages in recovery after operation for fistula—the oil facilitating packing with dressing.—The first few dressings in these cases are usually painful.

Oleum Iodoformi et Creosoti. *Syn.* HUILE CREOSOTÉE IODOFORMÉE.

Heat Olive Oil 70, to 120° C. for 10 minutes. When cold add Creosote 5, Guaiacol 1, and Iodoform 10, lastly Ether 30. Supply in sterile bottle.

Iodoform Formagules (*cf.* **Formagules**).

Capsules (to show lack of pancreatic secretion), containing iodoform surrounded by **Formalised Gelatin** are prepared. If the pancreatic secretion is active, the capsule is dissolved and the iodoform set free. Iodine in the form of iodides and iodates can then be demonstrated in the saliva by testing with chloroform and a little dilute nitric acid. The test is a useful means of demonstrating, firstly, the length of time that food (in this instance the capsule) remains in the stomach, and secondly, whether the pancreatic secretion is active or not. If no iodine reaction is obtainable in the saliva after the administration of the capsule it may be concluded either that the capsule has not passed from the stomach, or that the pancreatic secretion is in abeyance — Byrom Bramwell, Clinical Studies, Vol. II.

Another test is the administration of 2 to 3 ounces of Sugar before breakfast. The urine is tested in a couple of hours, when sugar is present disease of the pancreas is suspected.

Pancreatic Infantilism is improved by administration of Pancreatic Extract ¼ and 2 grains—0·05 and 0·15 Gm. respectively.

Collodium cum Iodoformo.

Iodoform 1, Flexible Collodion 12. P. Jap. and FR. Cx. 1 in 10.

Acetone Collodion will dissolve 5%. A pigment to venereal sores.

Emulsio Iodoformi. *For injection into sinuses.*

Iodoform, in fine powder, 1 (Alcohol 90% *q.s.* to moisten. St. Barts., G.H.), Glycerin 7, Boiled Water 2. Mix well in above order.

Lister used simply 1 in 10 of glycerin as in L.H. In **Glycerinum Iodoformi, K.C.H.**, the Iodoform is washed with 1 in 20 Phenol.

Most effective before caseation has occurred. For filling a cavity in the bone, after removing caseating tissue Iodoform 1 and Boric Acid 4 is useful.

Injectio Iodoformi. *For Bladder Injection.*

Iodoform, in fine powder, 1, Mucilage of Tragacanth 2, Water 7. This is less irritating than the Glycerin Emulsion (should be diluted 20—40 times with warm water).

Gauze, Gauze Bandages, Wool, and Lint contain 5%, 10% and 20%, British made contain correct quantity.—G. Lenthal Cheatle.

In making **Gossypium Iodoformi**, P.Jap.IV. directs to dissolve Iodoform 1 in Liquid Paraffin 1 and ether 18, soak cotton wool 18 in same, press gently until of uniform colour and dry.

Insufflatio Iodoformi.

Iodoform 2, Starch (carefully dried) 1. In specific affections of the throat, antiseptic and mildly caustic.

℞ **Insufflatio Iodoformi Composita.**

Iodoform 6, Boric Acid 6, Morphine Acetate 1.

Iodoform and Eucalyptus Bougies. **Cereoli Iodoformi et Eucalypti.**

Iodoform precipitated, 5 grains. Eucalyptus Oil 10 minims. Theobroma Oil 35 grains. To make a bougie 4 inches long. Used for acute gonorrhœa. When the symptoms have subsided, any remaining discharge may be treated by zinc sulphate injections.

Injectio Iodoformi Ætherea.

Phthisis has been treated by intravenous injection of Iodoform ¼ to ½ grain doses in 40% Liquid Paraffin in Ether. Strength 10 minims to contain ½ grain of Iodoform. Cases received ½ grain every second day on an average—begin with ¼ grain to see how patient stands it. **Benzoyl Chloride** has also been used in place of Ether as solvent, and given by *intra-muscular* injection.

Iodoform 1/6 grain with Menthol 1 grain in Almond Oil 15 minims has also been used. **Sterules** of this are made.

Whooping cough has been treated by Iodoform intravenously. *Dose.*—1 and 1½ grains in 0·720 Methylated Ether.

Leprosy treated by ½ grain doses in a solvent of 3 minims Liquid Paraffin and 7 minims Ether intravenously.—L i./14,1806.

Iodoform 5 grains Cyllin 5 minims, Olive Oil ½ ounce in introthoracic sepsis as packing.—W. Gordon and M. E. Gates, B.M.J. i./18,173.

Iodoform Varnish (Whitehead's).

Benzoin 4, Storax 3, Balsam of Tolu 1, Purified Ether 40; dissolve, strain, and add Iodoform 4. For surgical application.

Mencière's Solution 'A.' For embalmment of wounds. Iodoform 10, Peruvian Balsam 30, Guaiacol 10, Eucalyptol 10, Ether 100.

Changes the aspect of wounds, often of the most septic. Previous successive lavage with three antiseptics: Sublimate 1 in 1000, Carbolic 1 in 40, Hydrogen Peroxide 1 in 3. All germs and spores whether anaerobic or aerobic are not equally sensitive to the three.

This solution employed to soak wicks of gauze or injected into sinuses. His 'B' solution also used: differs from 'A' in the quantity of ether which is 1000 instead of 100. May be used instead of or in absence of Hydrogen Peroxide. Powerful antiseptics but sparing cells—in contradistinction to Iodine which causes necrosis of cells and leaves a surface which is an excellent culture medium for bacteria.—L. i./15,269 · see also F. C. Madden, use amongst Turkish wounded, i./16,614.

Ophthalmic Lamels (Gelatin) contain $\frac{1}{1000}$ grain.

Pasta Iodoformi R.D.H.

Iodoform 6, Tannic Acid 1, Liquefied Carbolic Acid *q.s.*

Cinnamon Paste and Iodoform Paste are also used by Dentists and are understood to mean Iodoform Powder mixed into a paste with Cinnamon Oil. Used for treating septic root canals.

Pencils of Iodoform, the thickness of a No. 9 catheter, for uterine medication, are prepared with iodoform 15%.

Pigmentum Iodoformi. *See* **Collodium cum Iodoformo** *antea.*

Suppositories contain 1, 3 or 5 grains in each with Oil of Theobroma *q.s.* For fissure of the anus and irritating hæmorrhoids.

Unguentum Iodoformi, *Off.* is 1 in 10 Prepared Lard. The formula is unsatisfactory. Iodine is liberated and it turns a dark colour. Potassium Carbonate 1% added prevents this. R.O.H. has 15% in Soft Paraffin.

Inguentum Iodoformi cum Eucalypto. R.O.H. Iodoform 2, Eucalyptus Oil 18, Hard Paraffin 40, Soft Paraffin 40.

Iodoform Vaseline (10%). A useful surgical dressing to wounds.

Basic meningitis treated by inunction of Iodoform Ointment (15 grains to the ounce of vaseline), rubbed thoroughly into the back of the neck and posterior part of the scalp night and morning. Small doses of Potassium Iodide and Bromide. Within a week temperature reduced and symptoms relieved. The method, it is believed, would lessen mortality from meningitis.—L. i./11,24.

Pasta Moorhofi R.V.I.

Mix Iodoform 60, Cetaceum 40, Sesame Oil 40, and add 5% of a mixture of Carbolic Acid and Camphor, equal parts.

Collapsible Tubes (with Catheter attachment) of **Iodoform and Eucalyptus Ointment** of each 5%, and of **Iodoform 5% and Cocaine 2% Ointment** are useful for gonorrhœa. BP1

Iodoform-Acetone. A Styptic antiseptic liquid stated to be made by mixing Iodoform 10 Gm with Acetone 100 Gm., adding 3 drops of Ammonia, allowing to stand 3 days and filtering.—P.J. i./17,209.

Succedanea or Substitutes for Iodoform.

Thymol Iodide, U.S. *Syn.* ✱**Aristol.** DI-THYMOL-IODIDE.

FR. CX. $[C_6H_2(CH_3)(C_3H_7)OI]_2 = 550{\cdot}132$.

ARISTOL: T.M. No. 93538 registered 1890. Renewed as from Oct. 1917.

PATENT: 5079 of 1880. Now public property.

Manufacture.—The following formula according to our work is better than the patent.

Dissolve Thymol 1·5 and Sodium Hydrate 1·6 in Water 50; into this pour with constant stirring a solution of Iodine 6 (probably 4 sufficient), Potassium Iodide 8, in water 50.

Yield is about 2·9 from above quantities.

Possible equation :—

$$\underset{300\text{ approx.}}{2C_6H_3.CH_3.C_3H_7.OH} + 6I + 4NaOH = \underset{550\text{ approx.}}{\left\{\begin{matrix}C_6H_2.CH_3.C_3H_7OI\\C_6H_2.CH_3.C_3H_7OI\end{matrix}\right\}} + 4NaI + 4H_2O.$$

The name "Iodo-Thymol Iodide" given in the patent does not convey any correct impression. Our analyses indicate a body of the composition Di-Thymol di-Iodide.

A brown powder containing about 45% Iodine; must not be heated above 100° F. nor exposed to light. ***Soluble*** in Alcohol and Oils, insoluble in Water

Incompatible with alkalis, Mercuric Chloride, Metallic Oxides or anything decomposing Iodides.

Used for psoriasis, lupus, eczema, and for ozæna; as dusting powder alone or diluted 5 to 50%. Ointments 2 to 10% and Pastes also employed. For blepharitis and conjunctivitis 10% in sterile Sesame Oil Solution is suggested, also for burns and ulcerations.

For skin ulcers with equal weight of dried Ferrous Sulphate.—L. i./09,1224.

Suppositoria (Theobroma basis), 1 grain in 15 grains for hæmorrhoids.

'Collapsubes' of Aristol Ointment 10% for venereal diseases of the urethra.

Formamin-Ethyl-Iodidum. $(CH_2)_6N_4C_2H_5I = 296{\cdot}128$.

Suggested Dose.—5 to 30 grains (**0·3 to 2 Gm.**).

A combination of Hexamethylene Tetramine, and Ethyl Iodide. In white crystalline scales or needles. *Soluble* 1 in 2 of Water, and about 1 in 40 of Alcohol 90%. May be of use as a urinary antiseptic having a more or less sedative action. It is apparently stable in aqueous solution. The author has prepared this compound, but it is not suitable for internal use. Physiological tests showed that injections of the substance caused cirrhosis of the liver in a guinea-pig. Locally may be useful as an antiseptic.

Formidin. (Capsules contain 5 grains.)

Stated to be METHYLENE-DI-SALICYLIC IODIDE $C_{15}H_{10}O_6I_2$. *Dose.*—1 to 5 grains (**0·06 to 0·3 Gm.**)

A white powder insoluble in water, alcohol and dilute acids;

It decomposes in the presence of alkali, hence used as intestinal antiseptic. Applied locally in skin affections. Its action said to be due to the splitting off of salicylic acid, formalin and iodine, but the iodine content is somewhat less then theory demands.—B.M.J. i./08,1124.

Formidin Gauze sterilised moist in 1 square yard and 5 square yards in glass jars, also in cartons.

Formidin Tape, ½ inch wide, 10 yards long, in glass jars; also 1½ inch, 5 yards.

Iodol.—*Syn.* TETRA-IODO-PYRROL. $C_4I_4NH=570{\cdot}716$.

GERMAN PATENT (35,130/1885) expired. *Not a Trade Mark.*

Dose.—1 to 3 grains (**0·06 to 0·2 Gm.**).

Brownish powder, containing 89% iodine, obtained by acting on pyrrol with iodine in presence of alcohol. It explodes if rubbed with mercuric oxide. Decomposes at 140° C.

Soluble 1 in 145 of glycerin, 1 in 6 of absolute alcohol, 1 in 21 of 90% alcohol, freely in ether; also in chloroform and oils. Insoluble in water.

Uses.—Painless wound dressing for buboes, ulcers, and ear discharges.

An ointment, 1 to 5 of Vaseline, and a solution, 3 parts to 35 of alcohol and 62 of glycerin, have been used for granular and chronic conjunctivitis with good results; and a solution of Iodol 1, Alcohol 3, Glycerin 21, as a pigment in diphtheria. Also Iodol 2, Menthol 1, Almond Oil 96, for throat spray or pigment.

1% of menthol covers odour of Iodol, and is said to render it more active.

'**Collapsubes**' with catheter attachment of Iodol ointment 5, with Eucalyptus oil 10% with soft Petroleum basis are made for treatment of gonorrhœa.

***Sozoiodol** (T.M. 82513). **Di-Iodo-para-Phenolsulphonic Acid.** $C_6H_2I_2OHSO_3H$ (1 : 4)=425·962.

Contains 59% of Iodine and 7·5% of Sulphur. Has been combined with **Sodium** $C_6H_2I_2(OH)SO_3Na.2H_2O$ = 483·996. **Potassium** $C_6H_2I_2(OH)SO_3K$ =464·064. **Mercury** $C_6H_2I_2(O)SO_3Hg$ = 624·546 and **Zinc** $[C_6H_2I_2(OH)SO_3]_2Zn6H_2O$=1023·374. The first is ***soluble*** 1 in 11 of water. It has been given internally in doses of 15 grains for diabetes. This and the Potassium Salt in 2 to 10% ointments and powders are used externally to wounds, abrasions, and skin affections. Lotion 2 to 10% for gonorrhœa, conjunctivitis, and as mouth-washes. They are all powerful germicides.

Sozoiodol-Mercury.—*Dose.*—¼ to ½ grain (**0·016 to 0·03 Gm.**) twice or thrice daily in syphilis, in yellow powder containing 31·23% Hg, injected in syphilis. It is applied to venereal sores, cracked nipples and parasitic skin diseases.

Traumatol, an Iodo-Creosol compound.

A greyish amorphous powder insoluble in water, used as a non-toxic antiseptic. A **Liquid** preparation is also made.

IODUM.

I=126·92.

For History and Kelp Industry, see Vol. II.

The following medicinal inorganic iodides contain the halogen approximately in these proportions:—Ammonium Iodide (NH_4I) 87·5%, Lithium Iodide (Anhydrous) (LiI), 94·75%, Potassium Iodide (KI) 76·4%, Rubidium Iodide (Rb I) 59·75%, Sodium Iodide (Na I) 84·6%. Strontium Iodide ($Sr I_2 + 6 H_2O$) 56·45%.

Soluble.—In Water, 1 in 5,000, readily in Alcohol 90%, Ether 1 in 4, Chloroform 1 in 30 about, slightly in Glycerin. Very soluble in Potassium Iodide Solution.

For Iodine Assay and the 'Iodine Number' of Fats, etc., see Vol. II.

Antidotes.—Stomachpump, Emetics (ApomorphineInjection), Starch, Saccharated Solution of Lime, Demulcents and Stimulants; finally, Opiates.

Sodium Hyposulphite would be best chemically. Sodium Tetrathionate is formed, which is stated to be non-toxic. A 10% solution will combine (decolorise) ½ its weight of Tinctura Iodi Fortis *Off.* Let the patient sip a solution during intervals of vomiting.

Skin rash due to Iodine may resemble variola.

Uses.—Internally is variously used as Tincture *q.v.* in influenza, catarrhs, epilepsy, and to reduce obesity. Typhoid has been well treated with it combined with a little Phenol as a drink.—*Vide* Tincture.

Externally.—Irritates the skin, if too strong will blister. As counter-irritant painted on chilblains, over inflamed joints, spots of pleurisy, sore gums and scrofulous glands, to abort boils, and is injected as tincture to cure hydrocele, *cf.* also Morton's Fluid for spina bifida. For ringworm (*cf.* Coster's Paste). Is inhaled to check profuse expectoration in chronic bronchitis.

Iodine is a powerful germicide. A 1% solution has been stated to be equal to Mercuric Chloride 0·5%. *Cf.* **Skin Sterilisation** *postea* and Chapter on Antiseptic Powers, *Vol. II.*

Catgut (*q.v.*) is sterilised by immersion in 1% alcoholic solution.

Burns are well treated by a 2% alcoholic solution of Iodine.

In puerperal sepsis as a douche—*vide* **Injectio Iodi**.—C. H. W.

For tuberculosis the use of **Nascent Iodine** (Pfannenstiel's Method) by the mouth has been suggested, *i.e.*, by giving Sodium Iodide in doses of 0·5—4·0 Gm. per day, not more than 2 Gm. being given at one time, *per os*, and Ozone (made electrically in the room) by inhalation immediately after. The Iodide is carried by the blood and meets the Ozone in the lungs.

In lupus the Nascent Iodine has also been obtained by internal use of Sodium Iodide and Hydrogen Peroxide locally on gauze tampons into the nose. Sodium Iodide in small dose at first (daily). At end of the week 30 grains in the 24 hours. Nasal cavities packed with gauze containing Hydrogen Peroxide, and a little Hydrochloride Acid and Ferric Chloride.—L. ii./12, 1784.

The method has also been used in laryngeal tuberculosis, and in war.

In phthisis, E. C. Reeve gives an account of use of the method. 30 grains of Potassium Iodide are given at 7 a.m. in ½ pint of water. Four hours later, 1 ounce of Chlorine Water in ½ pint fresh lemonade, repeated at 2 hours' intervals until sufficient has been given. At first 3 ounces of Chlorine Water are given daily. At end of three weeks increase dose to 4 ounces of Chlorine Water and later to 5 ounces. Slight headache may be produced. Sputum, weight, temperature, sleep and appetite improved.—Pr., Sept.,'13 and June,'14.

Corneal ulcers treated by a 1 : 20 or 1 : 30 Tincture of Iodine after preliminary use of Cocaine. The Iodine is taken up on a probe or glass rod and held in the air a minute or two for the Alcohol to evaporate, then the ulcer touched with it. The Iodine is therefore almost solid and cannot diffuse.—Pres., Sept. /20,310, 311.

Iodine is a wonderful tonic for children, especially those of tuberculous tendencies, 2 minim doses of weak Tincture thrice daily in peppermint water. Improves appetite and imparts vigour.—H. E. Waller. Pres., April, 1917.

Incompatible with alkalis, alkaloids, starch, soluble lead and mercury salts, carbolic acid, chloral hydrate and sodium thiosulphate.

Chloroformum Iodi, 1 in 30.

Stains less and does not promote desquamation, itching or dermatitis like alcoholic solution.

Glycerinum Iodi.

Iodine 1, Glycerin 50. Heat carefully till dissolved,—some decomposition of glycerin takes place. A useful pigment, the skin does not harden by repeated application, nor peel off. Water helps solution, *cf.* Morton's Fluid.

For ***internal use*** this preparation is quite suitable diluted with water with which it mixes temporarily. *Dose.*—On lines of the Tinctura Iodi Fr. Cx. (Bird's 'intensive') method of use. It is approx. $\frac{1}{5}$ the strength.

Glycerinum Iodi C.X., is Morton's Fluid, *sine Aqua.*

Injectio Iodi Hypodermica Fortissima.

Iodine 360 grains, Potassium Iodide 360 grains, Distilled Water 4½ drachms. Should measure exactly 1 ounce and contain ¾ grain free Iodine in each minim. *Dose.*—3 to 5 minims for fibrous bronchocele.

A grain of Iodine may be held in solution in a minim of fluid, by employing Sodium Iodide in the proportion of Iodine 3, Sodium Iodide 2, and Water *q.s.* to 3 volumes.

Iodo-Glycerin Solution. **Injectio Iodi, C.L.T.E.** *Morton's Fluid.* *Distinguish from Douche which is also called 'Injection.'* Iodine 10 grains, Potassium Iodide 30 grains, Water 25 minims, dissolve, add Glycerin to 1 ounce. In spina bifida about 30 minims have been injected into the tumour, also injected into solid goitre.

Injectio Iodi, C.H.W., L.H. IODINE DOUCHE.—Weak Tincture of Iodine 2 drachms, Water 1 quart. For injection in puerperal sepsis.

Gangrene of the vulva, vagina and cervix treated by a douche of normal saline, cutting away the gangrenous parts, then giving a weak iodine douche, followed by packing with Balsam of Peru gauze.—B.M.J.E. ii./09,43.

Indiscriminate douching by women a great mistake.—W. E. Fothergill. B.M.J. i./18,445.

Endometritis treated by swabbing and irrigation with a mixture of solution of Iodine (1 in 10) 1 part and Glycerin 7.—R. Hobbs, B.M.J. ii./21,35.

Petrolatum Iodi.—*Iodine Jelly.* Contains 2% Iodine. Employed for 'plugging' with gauze in surgical operations.

Iodinol.—*Martindale.*

Dose.—30 to 45 grains *per os* of the 25%=about 10 to 15 grains of Potassium Iodide. **Capsules** contain 30 grains (**2 Gm.**). Hypodermically 30 to 90 minims (**2 to 6 Cc.**) of the 25% preparation. (Commence with the same dose of the 10% compound.)

Sterules, Hypodermic, contain 30 (2 Cc.) and 60 minims (4 Cc.).

For treatment of tertiary syphilis larger doses slightly warmed have been given on alternate days hypodermically.

An additive compound of Iodine and Sesame Oil, in strength of 10 and 25% of Iodine, prepared by repeated iodising of Sesame Oil by means of Iodine-Monochloride. The preparation is a thick brown oil. The 25% has Sp. Gr. 1·23, and the 10% 1·025. It permits of lengthy and continuous administration of Iodine. Either the 10% or 25% preparation may be used by inunction.

Soluble in ether and in chloroform, insoluble in alcohol.

Iodinol may be given in beer, wine, milk, shaken with syrup or emulsified as **Emulsio Iodinol** :—Iodinol 25% 2 ounces, Gum Acacia 1 ounce, Chloroform 12 minims, rub together and add quickly with vigorous agitation Water *q.s.* to 6 ounces. Dose of 2 drachms = about 12 grains potassium iodide.

Iodinol Tablets contain 3 grains of the 25% preparation, *i.e.*, ¾ grain Iodine = 1 grain Potassium Iodide. *Dose.*—Up to 90 grains (30 tablets) per diem.

Iodinol cum Extracto Malti. *Dose.*—1 ounce (30 Cc.).

Iodinol 25% 1, Malt Extract (thick) to 4. A palatable method of administration.

Uses.—Scrofulosis, convulsions of children, tuberculous infections, *e.g.* of the larynx, pleuritic induration, facial paralysis, arteric-sclerosis, gout, bronchial troubles, actinomycosis, and syphilis have been well treated by internal and local use—in many affections either inunction or hypodermic injection can be employed. Uterine fibroids have been treated by injections. It has been found useful instilled for eye affections.

Taken *per os* it is thought to pass through the stomach into the duodenum,—here it is acted on by the bile and pancreatic secretions and is emulsified. The greater part of the iodised fat is stored in the tissues, *e.g.*, marrow, liver, etc,

Asthmatic affections are relieved by an Iodinol capsule quickly without causing headache.—Canny Ryall.

(✱ **Iodatol** (T.M. 364270) is similar, made in 10, 20, and 25% strength.)

For a comparison of the amount of Iodine in **Organic Iodine Compounds** with that in Potassium Iodide, *vide Vol. II.*

For a résumé of a number of these preparations and for formulæ for **Egg Combinations** of Iodine see G. Sharp, P.J. ii./13,99,100.

Broncho-Spirochætosis. A peculiar form of bronchitis with *Sp. bronchialis* as described by Castellani in 1905 as causal agent.

The Tartar Emetic mixtures of Castellani *q.v.* are advised.

Sub-acute and chronic cases have been treated with **Lipiodol**, containing 54% Iodine in Poppyseed Oil. A course of 3 to 6 injections of 2 Cc. intramuscularly. No symptoms of iodism appear. At the end of course spirochetes practically disappear and there is scarcely any sputum. One series of injections usually sufficient, but as a precautionary measure may be repeated 2 weeks later or Iodotannic Syrup administered 3 times daily for 15 days, followed by 2nd, 3rd and 4th course with one week's interval between each. Practically all the writer's patients recovered under this treatment.—Najib Farah, Jl. Trop. Med., April 2/23,103.

Radiographic Localization of spinal lesions by Sicard's Method. Lipiodol is here stated to contain 40% Iodine.—Percy Sargent, B.M.J. ii./23,174.

Iodum Oleatum. (*Not for internal use.*)

An Iodine-Oleic Acid compound containing 10% of Iodine. When thoroughly rubbed into any part does not stain the skin, but is rapidly absorbed, and its specific effect is soon apparent. Suitable for inflamed joints, enlarged scrofulous glands, skin affections, sciatica, sprains, chilblains ; should prove of value in tinnitus aurium.

Tinctura Iodi Fortis (*Off.*). *Syn.* **Liquor Iodi Fortis, Strong Solution of Iodine** (B.P. 1898).—Pigmentum Iodi, Linimentum Iodi (B.P. 1885).

This is now 10% *w/v* and conforms with F.I. Its composition is Iodine 10, Potassium Iodide 6, Distilled water 10, Alcohol 90% to 100. It is slightly weaker than B.P. '98. U.S. is 7%.

Excess of Potassium Iodide in preparations of Iodine. The proportion or ratio of the two bodies has varied considerably. The ratio 3 grains of Potassium Iodide for every 5 grains of Iodine, as *Off.* is sufficient for rapid solution and this amount is economical.—T. E. Tawell, P.J. ii./13,837.

Liquor Iodi (B.P. 1885).—*Syn.* LUGOL'S SOLUTION.

Iodine 2, Potassium Iodine 3 (U.C.H. has 2), Water 40.

Liquor Iodi Compositus, U.S. Iodine 5, Potassium Iodide 10, Water to 100.

Mistura Iodi Composita E.L.—Tincture of Iodine 1 minim, Glycerin of Carbolic Acid 1 minim, Caraway Water to 1 drachm.

℗ **Pigmentum Iodi et Aconiti.** *Syn.* TINCTURA IODI ET ACONITI.

Weak Tincture of Iodine 1, Tincture of Aconite (Fleming's) 1.

Periodontitis is relieved by Iodine, or Iodine and Aconite Pigment.

Pigmentum Iodi Æthereale.

Iodine ½, Alcohol 90% 3, Methylated Ether 2½. This dries rapidly.

Pigmentum Iodi et Olei Picis, Mid. H. *Syn.* PASTA IODI ET PICIS, COSTER'S PASTE.

Mix Iodine 1, Light Oil of Wood Tar 4, carefully, applying heat if necessary. Ebullition occurs and a part of the oil is oxidised and forms a resinous deposit.

Uses.—For ringworm of the scalp; after well shaking the bottle it should be well brushed in with a stiff brush; a scab will be produced which should be removed in a few days, the part cleansed by soaking with oil, and then soap and warm water; after drying, more paste should be applied. It seldom causes pain.

Iodine, Chloral Hydrate and Carbolic Acid, equal parts, have also been recommended for ringworm.

Pigmentum Mandl, T.H.

Iodine 6 grains, Potassium Iodide 20 grains, Oil of Peppermint 5 minims, Glycerin to 1 ounce. Used as a throat stimulant.

Iodised Absorbent Wool 6% in rolls. To prepare, saturate cotton wool with ether containing sufficient iodine for above strength, as also sufficient glycerin to produce 5% in the finished article and expose to dry. Is said to have saved life in a case of double pneumonia.

Syrupus Iodo-Tannicus (Martindale).

Dose.—½ to 2 drachms (2 to 8 Cc.), containing ⅗ to 2½ grains of Iodine, in water or wine.

Iodine 2, Tannic Acid 2, Glycerin 20, Water 30, Syrup (with flavourings and carminatives) *q.s.* to 100.

Combine the Iodine and the Tannin in presence of the water, glycerin and syrup *q.s.* until no indication of free Iodine with starch, cool and add the other ingredients. This contains the Iodine to a great extent in the form of Hydriodic Acid. (See last Edn., p. 501.)

The Fr. Cx. Syrup is only $\frac{1}{10}$ this strength, viz. 0·2% Iodine.

Uses.—Of great value for enlarged glands in children and also as a tonic after removal of tonsils and adenoids. Suggested in lymphæmia, anæmia, dysmenorrhœa and pulmonary affections.

Specially useful in cases of chronic lymphadenitis associated with or independent of adenoids. In atrophic rhinitis has given good results especially when combined with arsenic, and in simple bronchocele supplemented by the external use of Iodine Oleate or **Unguentum**

Iodi Intinctum (*q.v.*). In arteriosclerosis it is often more valuable than Iodides or Thyroid preparations.

Syrupus Tann-Iodo-Phosphoratus.

Dose.—½ to 2 drachms. Contains 5 grains Monobasic Calcium Phosphate in 2 drachms of the Syrupus Iodo-Tannicus.—*Martindale.*

Vinum Tann-Iodo-Phosphoratum.

Dose.—½ to 2 ounces (containing 1 to 4 grains of Iodine). Is eight times weaker than the syrup above. These two preparations are elaborations of the Syrupus Iodo-Tannicus above, and are suitable as tonics for children and invalids.

Tinctura Iodi (Mitis) (*Off.* and B.P. 1898). *Dose* (for vomiting).—2 to 5 minims (**0·12 to 0·3 Cc.**).

Iodine 1, Potassium Iodide 1, Distilled Water 1; dissolve, add Alcohol (90%) *q.s.* to 40.

Should be recently prepared or is liable to contain Aldehyde and Hydriodic Acid. This aldehyde in presence of Iodine and water oxidises, forming more Hydriodic Acid as well as Acetic Acid. The Acetic Acid may become etherised forming Ethyl Acetate.—'Pharmacal Notes.'

A little Iodic Acid added to the Tincture will prevent decomposition—it breaks up Hydriodic Acid as formed.—P.J. i./14,713.

Flavoring.—Syl Lavandulæ, Syl Vanillæ; Syrupus Aurantii.

Antidotes.—See under Iodum.

Tinctura Iodi (***Sine Potassii Iodido***), TEINTURE D'IODE, FR. CX. 1908, P.Hung. (Sometimes called *Indian Tincture of Iodine.*) P.G.V. is similar excepting spirit strength is 90—91·3% (Vol.)

Dose.—Max. Single (in FR. CX.) **0·25 Gm.** (3½ minims), Max. during 24 hours (FR. CX.) **1 Gm.** (14 minims.).

Usual Dose in Great Britain.—10 to 25 minims. According to Tom Bird (see Uses and Prescribing Notes) this dose can be given thrice daily in arthritis. (Usually first week, 10 minims. *t.d.p.c.*; second week, 20 minims; third week, 30 minims.)

Composition.—Iodine 1, Alcohol 95% (by volume), 9 by WEIGHT. (In making it *by volume* use 11·03 of the alcohol instead of 9 by wt.).

Sp. Gr. of the tincture is 0·888. 1 Cc. contains 0·089 Gm. Iodine. 10 minims contains 0·81 grains. For P.G. 1 Cc.=0·09 Gm.

Uses and Prescribing Notes.

This Tincture of Iodine is given as a tonic before meals in tuberculosis, also in the commencement of "la grippe" and ordinary colds; largely used on the Continent with excellent results. In vomiting of pregnancy invaluable, and small doses in sea-sickness.

The 'intensive Iodine Treatment' of tuberculosis with it, was the subject of extended research by L. Bourdreau, who found that large doses can be given by a gradual increase. He suggested that the method might be of use in other affections. Dr. Wm. Ewart, of St. George's Hospital, tried it for his own arthritis with result that instead of 'being unable to go upstairs one at a time, he could manage three at a time.' Tom Bird, L. i./20,546, states he had remarkable success in a number of arthritic cases and in cases of chronic gout and in cases called 'rheumatic gout.' As *much as*

10 *grains of Iodine per diem can be given in this way.* There may be slight catarrh of the nasal mucous membrane, but no iodism as from Potassium Iodide.

The Iodine is probably deposited in a fine condition on the mucous membrane of the stomach and therefore slowly absorbed.—T. Bird, Pres. Feb. '21, 190.

In taking the Tincture, the patient may place the dose (15 *drops* are equal to approx. 10 minims) in a glass and add 5 ounces (½ tumbler) of water to it. The dose may also be given in milk, in which an Iodo-Casein compound is formed.

The following makes a clear solution :

Tincture of Iodine Fr. Cx. 1908.
Spirit of chloroform.
Glycerin.
} Equal parts.

Dose.—30 minims (2 Cc.)=approx. 1 grain of Iodine.

(**Glycerinum Iodi**, 1 in 50 v.p. 503, is miscible with water temporarily.)

It has been suggested (G. Walker, P.J. i./21,4, L. i./21,239) to use more of 90% Alcohol, as the 95% is not readily available. A further idea (Thos. Stephenson, Pres., Feb., 23,64) is to use the Tinctura Iodinei of the old Edinburgh Pharm. : 1 grain in 16 minims of S.V.R., beginning with a dose of 2 to 3 minims, but personally *we do not favour* upsetting the classic strength.

It is unfortunate, as the method of using the Tincture is in considerable vogue, that the 10% *w/w* preparation is now actually superseded by Fr. Cx. Supp. II. (1922), and the *title* of the Iodised Tincture of Iodine (Teinture d'Iode iodurée) contained in the Supplement issued in 1920, is to be altered to Official Tincture of Iodine (**Teinture d'Iode Officinale**). This preparation is : Iodine 10 Gm., Potassium Iodide 4 Gm., Alcohol (90 per cent.) 136 Gm. (It contains $\frac{1}{15}$ of its weight of iodin).—P.J. ii./22,162 ; ii./22,609.

Pharmacists have therefore to some extent been at a loss as to what to employ for ' French Tincture.'

We advise that ***unless otherwise directed the original 10% w/w of the Fr. Cx. should be dispensed.***

Prescribers would do well to order ' Tinct. Iodi ***Fr. Cx. 1908 10% w/w.***' to prevent misunderstanding. (The fact remains that the French Codex Authorities have decreed that the 10% *w/w* Tincture shall be *delcted.*)

A comparison of the Tinctures of Iodine of various countries.—M. Shaw and V. Cofman, P.J. i./23,453.

Endometritis treated by **Churchill's Iodine Tincture** (dissolve Iodine 1,200 grains and Potassium Iodide ½ ounce in Water 4 ounces, then add Alcohol 90% to 16 ounces) applied subsequently twice a month for three months to the endometrium apparently diminishes the number of relapses following curetting.—B.M.J. ii./09,1030,1204

In vomiting due to utero-gestation Tincture of Iodine 5 to 10 drops with Syrup and Water has been used.—Yeo.

In mercurial stomatitis Iodine mouth-wash (½ drachm of the tincture to an ounce of water) useful.—Yeo.

Small amounts of Iodine in solution have been injected in anthrax as also in erysipelas.

Varicose veins treated by injecting 1% solution of Iodine made with Potassium Iodide (Schiassi's Method).—L. ii./22,1288.

Typhoid.—A mixture of equal parts of **Tincture of Iodine** (*Off.*) **and Pure Carbolic Acid**—two or three drops in a tumbler of water by the patient's bedside, and renewed as often as required. The tongue cleared, temperature fell, diarrhœa ceased, the fever was cut short. The action is probably due to the iodising of the blood serum. It is not clear how the Iodine could exercise direct effect on the intestinal ulcers, unless it were first absorbed from the stomach and excreted later into the intestine. Had this treatment been used in the South African War many valuable lives would have been saved.—David Walsh, L. i./13,1346.

Cystitis treated by douche of 0·2% Tincture of Iodine. Non-irritating and efficient.—H. Lyon Smith, L. i./15,345.

For a cold, Iodine 8 or 10 drops of 1% solution, twice daily, fasting, is specific.—Per Pres. Jan. '23,14.

Sterilisation of the skin of operation areas. The **Weak Tincture** *Off.* is adequate, preferably made with 70% spirit (*vide infra*) but the 10% solution (Tinct. Iodi Fortis) in 90% Alcohol has often been used, it may however produce acute dermatitis. The method was devised by Lionel Stratton—*vide* B.M.J. i./12,522, but it had its origin in pre-Listerian days.

Iodine Sterules are made in two forms :—

Form (1) encased in silk and absorbent wool. The "Sterule" is snapped between the fingers and the Iodine Solution is absorbed by the surrounding material, which is then gently dabbed on to the part required.

Form (2). These are similarly encased, and contain a **Concentrated Solution**. One "Sterule" placed in a bottle or cup with 4½ ounces of Alcohol 70% or 3½ ounces of 'S.V.R.,' with 1 ounce of water (in urgency use simply a gill of neat brandy or whiskey), produces a supply of fresh 2% Iodine Solution for use on larger surfaces. The "Sterule" must be gently tapped to break it and well stirred round,—the glass fragments are retained by the wrapping. For war the "Sterules" are placed in metal tubes, which could be carried by the soldier.—*cf.*, A. G. Wildey, B.M.J. ii./12, 437.

Whatmough's Patent Ampoules No. 23,437/1914 have a bulbous end encased in a pad of material. This end is broken by striking the ampoule padded end downwards on some hard surface. The pad is then rubbed over the surface before applying the first field dressing.

As application to abrasions, cuts, scratches, etc., **Weak Iodine Tincture** (*Off.*) 2 parts, with Ether 3 parts, is used. Simple and time saving. Do not even cover the part afterwards if feasible.—B.M.J. ii./10,974.

When the Iodine Solution is used warm it has marked tendency to arrest capillary bleeding or oozing. As a lotion add the strong solution to water until of light sherry colour, in septic cases make it darker.—B.M.J. ii./10,1004.

Instead of making a futile attempt to cleanse a wounded, work-soiled hand it is sufficient to paint the wound and surrounding tissues completely with the tincture. There is a little smarting, but it prevents inflammation or subsequent rigidity of the joints. Allow to dry before dressing with gauze, etc.

It is wise to remove beforehand all comminuted bones and much mangled soft parts, but preserve even the smallest stump of thumb.—B.M.J.E. ii./10,77.

Rusty nail wounds and the like are well treated by packing the cavity with gauze soaked in Tincture of Iodine and allowing it to remain in for two or three days. If sutures are required the skin along the edges should be painted to prevent stitch abscesses.—L. ii./11,238.

The Iodine produces hyperæmia, which is the real agent in producing asepsis. The increased supply of blood is not only in the skin itself, but also in the subcutaneous tissue.—L. ii./11,442.

Tincture of Iodine made with 70% Alcohol sterilised non-spore bearing organisms in seven minutes whilst if of Official strength 10½ minutes; Sublimate Spirit (1 in 1,000), however, sterilised in 2½ minutes. Aqueous solution of Perchloride 1 in 1,000 never sterilised in under 30 minutes (!). Experiments on the skin were also conducted, amongst the conclusions being that Iodine—Alcohol (the Alcohol being 70%) is more potent than Alcohol alone, but the Sublimate Spirit is better. Neither guarantees absolute sterility.—B.M.J. ii./11,1078.

Sterilisation of the skin with a Petrol solution of Iodine—B.P. Tincture strength—has been tried. It is cheaper than Spirit.

It no doubt increases leucocytosis in the area operated on. Used not only before an operation (appendicitis), but also over the skin sutures before applying the dressing of Iodoform Gauze, and again before the removal of the stitches, generally on the sixth day in children.—Major S. F. St. Dd.'s Green, Pr., Oct. 1912.

Fifty cases amongst the Egyptian fellah—patients with complete ignorance of cleanliness. Iodine 2% in Alcohol with an ordinary dressing.—F. C. Madden, B.M.J. ii./12, 765.

Used in a Caesarean section.—B.M.J. ii./12,1570.

A harmless first-aid remedy.—E. Owen, L. ii./13, 1063.

T. Lynn Thomas relates his experience since the days of '**Bryant's Sherry**.'—B.M.J. i./13,12.

Smallpox.—Iodine applied prevents pitting and aerial dissemination.—Pres. Jan. 1913,5.

Pus formed in a deep sinus after use of Iodine in an operation (abdomen had been painted four times with 2% Solution).—B.M.J. i./13,100.

In the preparation of the skin with Iodine it is important not to wet the part first. 1% **in Benzene** the most satisfactory,—experience in the Balkan Wars.—L. i./14,76.

2% Iodine is about equal to 2% Phenol but from point of view of efficiency and comfort use Phenol in preference.—Sir Watson Cheyne.—B.M.J. ii./14,868.

J. L. Stretton, the originator of Iodine Skin Sterilisation describes his further work with the 2½% Iodine and 2½% Potassium Iodide in S.V.R. After 3,000 cases he finds no reason to alter composition of the solution. Preliminary washing and scrubbing unnecessary and positively harmful. Excellent in abdominal surgery. Coils of intestine, etc., may rest on the skin which has been sterilised with it. **Grossich's Solution** (10%) is far too strong—would produce acute dermatitis in many people.—B.M.J. i./15,886. See also ii./15,278.

For all flesh wounds and abdominal and thoracic wounds paint a wide area with 2% Solution and wash the wound itself with 1 in 20 or 1 in 40 Carbolic or Iodine or strong Peroxide.—Sir A. A. Bowlby.—L. ii./14,1427.

In Naval Warfare—on the 'Tiger' was largely used.—B.M.J. ii./16,598.

Gas gangrene may possibly be prevented by local use, see Gas Gangrene. Tetanus cannot be prevented by injecting Iodine—see Tetanus.

For a wound in process of rapid cicatrization 1 in 15 of Alcohol 45% is ample—as used by Reclus (almost an equal quantity of Potassium Iodide to that of the Iodine will be wanted to make this). Nigay (Jl. de Méd. de Paris, Apl. 16—per N.Y. Med. Jl., May 16) condemns the 10% solution in 95% alcohol as used by some military surgeons. It may destroy the healthy epidermis and cause a patch of eczema especially if not freshly made and containing Hydriodic Acid. (To remove this 1% of Iodic Acid may be used which in presence of Hydriodic Acid forms Iodine and water). He prefers the use of Reclus's Ointment, *q.v.*

Its use is very irritating to most skins—may produce dermatitis, and the pain continues for some time after the dressing is applied. Good Deodorant. Spirit solutions act like hypertonic salines by inducing serous flow.—Casualty Clearing Station criticism.—A. Don, B.M.J. i./16,648.

Iodine in Liquid Paraffin. *Martindale.*

During the war we made experiments to produce a preparation of Iodine in Liquid Paraffin as a first-aid dressing to wounds. We determined that a Saturated Solution in Liquid Paraffin, Sp. Gr. 0·875 made in the cold is approximately 1% strength—the solution appeared to be quite stable (as compared with a corresponding Bromine Solution which we also made).

This strength is no doubt too strong to use to wounds—it would we believe be effectual diluted 10 or 100 times. A solution of this kind should have advantages over a spirit solution.

R. T. Dobson, B.M.J. ii./17,717, obtained good results from the preparation —strength not stated, in the treatment of trench-foot. It was used instead of plain oil for massage and seemed worthy of more extended trial.

Bromine in Liquid Paraffin.—Experiments showed that this is out of the question—interaction occurs with either strong or dilute solutions—the solubility is in the neighbourhood of 1 in 25—single link compounds of which the bulk of Russian Liquid Paraffin is composed as is well known would substitute Br. thereby liberating H.Br.). Further work is suggested with this reaction product. It could be washed free from acid. *cf.* p 62 and Paraffinum Liquidum.

Tinctura Iodi Ætherea.

Iodine 1, Pure Ether 40. For skin diseases.

Tinctura Iodi Decolorata, B.P.C.

Iodine 2·85, Alcohol 90% 27·5. Dissolve with a gentle heat, and add when cold Strong Solution of Ammonia 6·25. Keep in a warm place until decolorised (it takes some days), after which dilute it with Alcohol 90% *q.s.* to 100.

It forms a useful application for chilblains and for painting on exposed affected parts. The solution contains Ammonium Iodide and Ammonium Iodate.

Tinctura Iodi Decolorata Fortis was described in the Extra Pharmacopœia 12th edition and is occasionally ordered. It is prepared as above excepting that after keeping the mixture of Iodine, Alcohol and Ammonia in a warm place until decolorised it is not diluted at the finish with Alcohol to 100.

Decolorised Iodine Tincture, Belladonna Liniment, of each 25%, Soft Soap 50%. Useful for chilblains.

Tinctura Iodi Oleosa.

Iodine 1, Alcohol (90%) 9 ; heat to dissolve, and add Castor Oil 2. Repeatedly applied does not crack the skin as the tincture does.

Unguentum Iodi (*Off.*).

Iodine 1, in 25 of a Potassium Iodide, Glycerin and lard basis.

The presence of Potassium Iodide (and Glycerin) is essential to the conservation of Free Iodine in this preparation. The Free Iodine content in the *Off.* Ointment is considerably reduced after keeping for two or three months. A simple mixture of Iodine and Lard becomes rapidly attenuated in Free Iodine content—by chemical addition.—A.N.D. Pullen.

Unguentum Iodi Intinctum, Stainless Iodine Ointment,—*Martindale.* Iodine 1, Oleic Acid 4. Heat to effect absorption and mix with Soft Paraffin 14 and Hard Paraffin 1 previously melted together.

Possesses iodising properties (*cf.* Iodum Oleatum, the liquid equivalent) for use in rheumatic affections, enlarged glands, sprains, and syphilitic conditions.

✱**Kelpion** (T.M. 241134) and **Iodosol** are stainless Iodine preparations.

✱**Iodex** (T.M. 322589).—A stainless absorbable Iodine Ointment (containing 5%, together with a small proportion of free Iodine) to be either rubbed on to the part or applied and covered with oiled silk and cotton wool, to be used as above—where action of Iodine is required. Also made with **Methyl Salicylate. Suppositories** are made containing ⅜ grain Free Iodine in a neutral base. Each is coated with a soluble gelatin envelope. For use in fistula, anal fissures and hæmorrhoids.—L. ii./13,85.

Iodex applied on swabs to diphtheritic membrane and scarlet fever throats with advantage.—B.M.J. i./14,85

Unguentum Iodi Denigrescens. B.P.C. Iodine 5 per cent. in Vaseline heated to combine. Note: Vaseline is now specified.

For notes on a previous formula see last Edn.

Our formula for Unguentum Iodi Intinctum (*Stainless*) in which Iodine and Oleic Acid are used and which we devised some years ago is hard to beat.

Pasta Iodi et Amyli, U.C.H.

Starch, in powder, 1, Glycerin 2, Water 6; heat on water bath with stirring, and when nearly cold add Solution of Iodine U.C.H. 1. The latter is Iodine 1, Potassium Iodide 1, Water to 20.

Useful to cleanse and heal foul sores, especially such as are syphilitic (of the face).—Tilbury Fox. If applied on lint during the night, the sores may be hidden with calamine lotion during the day.

The original formula (as above) designed by the late W. Martindale need not be 'tinkered with.' It finds a place unaltered in many Hospital Pharmacopœias.—Peter Boa, P.J. i./15,485,501.

In the first edition (1883, p. 160) of the Extra Pharmacopœia, the composition is given as above (and has been so ever since). It is stated "in devising this formula the addition of Glycerin was found necessary."—W.H.M.

Iodival. *Syn.* ✱JODIVAL (T.M. 304500. MONO-IODO-ISO-VALERIANYL-UREA. *Dose.*—5 grains (**0·3 Gm.**) thrice daily in tablets.

A crystalline compound containing 47% of Iodine, as a substitute for Alkaline Iodides. Stated to pass the stomach unchanged and to be absorbed in the intestines. It is thought to enter the blood as the Sodium Salt $(CH_3)_2CH.CHI\ CO.Na.N.CONH_2$, being slowly absorbed.

IODINE-ALBUMEN COMPOUNDS.

Iodoprotein, *Martindale.*—*Dose.*—10 to 15 grains (**0·6 to 1 Gm.**) increased if desired.

A brown powder containing about 10% of Iodine and having slight odour of same.

Solubility.—The compound is insoluble in water and dilute Hydrochloric Acid; soluble, however, in dilute alkali, and for this reason this, and similar preparations, are advocated as substitutes for Alkaline Iodides,—assimilation is thought to take place in the intestines, and hence to cause no objectionable derangement of the stomach.

Uses.—In syphilis, arteriosclerosis, gout, rheumatism, exophthalmic goitre, asthma and in all cases where Iodides are administered beneficially, *e.g.*, scrofula, enlarged glands (orchitis).

Iodoprotein Tablets contain 10 grains (=1 grain of Combined Iodine).

A dose of Potassium Iodide containing Iodine 191 mgr. and a dose of Iodised Protein containing Iodine 188 mgr. were administered. The whole of the Iodine from both doses was excreted at the end of 48 hours, but the rate of excretion was different. At the sixth hour 37·7% Iodine was excreted in the case of Iodised Protein, as against 51·4% in the case of Potassium Iodide. In the same way the heavier salts of the halogens, such as Iodide and Bromide of Strontium yield up their Iodine and Bromine to the system at a slower rate than the correlated salts of Ammonium, Sodium and Calcium. Excretion may be rightly regarded as the measure of absorption, so that comparatively insoluble forms of drugs, *i.e.*, those of slower disintegration, are more likely to exert a longer continued activity.—Pres. Nov. 1911, p. 279.

Iodo-Casein.—*Dose.*—10 to 15 grains (**0·6 to 1 Gm.**).

A yellowish brown powder containing 15% Iodine. As an Inorganic Iodine Substitute. Insoluble in Acid, and partially dissolved in alkaline solutions.

Acidum Hydriodicum (*Off.*). *Syn.* **Acidum Hydriodicum Dilutum, U.S.** *Dose.*—5 to 10 minims (**0·3 to 0·6 Cc.**) in syrup.

It is readily prepared by heating red phosphorus and iodine in presence of water.

A colourless, sour liquid, which becomes dark in colour on exposure to light. If this happens on keeping shake with a little dilute Hypophosphorous Acid (*Off.* contains 1%). Sp. Gr. 1·085= about 12% of Hydrogen Iodide HI=127·928. (*Off.* and U.S. contain 10%). Commercially it is also prepared 20% with Sp. Gr. 1·17, and 46 to 47 % strength with Sp. Gr. 1·5.

Flavoring.—Syl Rosæ, Syl Origani; Syrupus Tolutanus, Syrupus Zingiberis.

Syrupus Acidi Hydriodici (*Off.*).

Average Dose.—30 to 60 minims (well diluted).

Diluted Hydriodic Acid 1 by wt., Water 0·5, Syrup to 10. Contains 1% HI. U.S. is similar, containing 1·4%.

Glycerinum Acid Hydriodici.

Dose.—20 to 60 minims in Water, increased to three drachms.

Experiments which we have conducted show that dilute Hydriodic Acid 1, Glycerin $4\frac{1}{2}$, and Water $4\frac{1}{2}$, produce a glycerole with good keeping qualities. Contains 1% hydriodic acid.

✱ **Gardner's Syrup**, "Hyodin," contains about $1\frac{1}{4}$% of Hydrogen Iodide. *Dose.*—1 to 3 drachms in water.

(✱Gardner's Unalterable Syrup of Hydriodic Acid—a label is T.M. 28138).

Vapor Iodi Ætherealis.

Iodine 3 grains, Ether 2 drachms, Carbolic Acid 2 drachms, Creosote 1 drachm, Alcohol 90% 3 drachms. Ten minims to be used in an inhaler, *e.g.*, the 'Ozonic.' Thymol may be substituted for creosote.

Iohydrin—*Martindale.* **Di-iodo-isopropylalcohol, Glycerin Di-iodo-Hydrin.**

$CH_2I.CHOH.CH_2I$=311·903.

Dose.—By inunction, ½ to 1 drachm weight suitably diluted in 25% or less Ointment. *Caution.—Is not given internally.*

A yellowish oily liquid (Sp. Gr. 2·5) prepared by heating *s*-dichlorhydrin with potassium iodide solution. Contains about 80% iodine.

Incompatible with water.

Soluble 1 in 75 of water. Being readiy absorbed by the skin is employed for inunction of iodine in inflammatory conditions, scrofula, pulmonary tuberculosis, bronchial asthma, &c.

Unguentum Iohydrin 25% or less as ordered in Lanolin basis is the most suitable strength. It should not be applied to any delicate portion of the body—pure Iohydrin alone is caustic.

✱**Sajodin** (T.M. 322559). *Dose.*—5 to 15 grains (**0·3 to 1 Gm.**) up to 90 grains per diem *after* meals.

The name given to the Calcium Salt of mono-Iodobehenic Acid $(C_{22}H_{42}O_2I)_2Ca = 970·802$. A tasteless powder containing about 26% Iodine and 4% Calcium, ***Insoluble*** in water, used in syphilis, bronchial asthma, arteriosclerosis, &c.—*See* B.M.J.E. ii./10,68.

Ferro-Sajodin Tablets.—7½ grains = 0·12 Gm. Iodine and 0·028 Gm. Fe. *Dose.*—One tablet two or three times a day after meals.

Assumed to be Iron-Iodobehenate. Contains 24·5% Iodine and 5·6% Iron Substitute for Inorganic Iodine and Iron. In syphilis, anæmia, etc.

Di-iodo Elaidic Acids containing 45 to 47% Iodine are more suitable for use. Tasteless compounds insoluble in the acid secretion, but decomposed in the intestines.—P.J. i /11,175

✱**Sabromin** (T.M. 322558). *Syn.* **Calcium Dibromobehenate** $(C_{22}H_{41}Br_2O_2)_2Ca = 1034·626$.

Dose.—15 to 45 grains (**1 to 3 Gm.**) in powder or tablets (7½ grains). Contains 29% approx. Bromine. White powder insoluble in water and alcohol. An alkaline Bromide substitute stated to have less tendency to produce bromism, the absorption being slow. Used in epilepsy.

✱**Iodostarin** (T.M. 318223). *Syn.* Di-Iodo-Taririnic Acid. $CH_3(CH_2)_{10}CI.CI(CH_2)_4COOH = 534·186$.

Dose.—Tablets containing 3 grains—1 to 3 *per diem.*

Taririnic Acid occurs as its glyceride in the oil of the fruits of Picramia Sow or Tariri—a *Simaruba* found in Guatamala. Leaflets melting point 50·5° C. The formula given by Schmidt is $C_{18}H_{32}O_4$ not $C_{18}H_{31}O_2$ which the above compound would indicate.

Iodostarin contains 47·5% Iodine. It is a tasteless compound from which the Iodine is probably absorbed in passing through the intestine and hence as a succedaneum to the alkaline iodides, is used in syphilis, actinomycosis and arteriosclerosis. Consumption of Alcohol simultaneously is to be restricted as iodism may result.

IPECACUANHA.

(*In numerous Pharmacopœias.*)

Dose.—As an expectorant, ½ to 2 grains (**0·03 to 0·12 Gm.**), as an emetic 15 to 30 grains (**1 to 2 Gm.**).

The dried root of *Psychotria Ipecacuanha* (*Rubiaceæ*)* from **Rio De Janeiro.** A second variety is the Minas Ipecacuanha from Brazil. A third is Indian from the same plant, grown in Straits Settlements; another variety is known in commerce as **Carthagena Ipecacuanha.** It is thicker, the annulations less marked (taking the form of narrow merging ridges) and its starch-grains are somewhat larger; this is less expensive, and is not official.

Flavoring of Liquid Ipecacuanha Preparations.—Syl Vanillæ, Syl Rosæ; Syrupus Aurantii.

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* F.I. uses the name *Uragoga Ipecacuanha.*—Baill.—P.G.V. has this.

Uses.—Expectorant, emetic. If taken in sufficiently large doses it is not its own antidote. Loosens phlegm, *e.g.*, in bronchitis, whooping cough and croup. In small doses is stomachic and increases the flow of bile. Was employed in the de-emetinised form (**Pulvis Ipecacuanhæ sine Emetina**, *dose* 5 to 20 grains) in dysentery, but recently emetine (*q.v.*)has been found to be virtually a specific for amœbic dysentery.* Frequent doses, 1 to 2 minims of the Wine of Ipecacuanha sometimes check sickness.

For tropical liver abscess Ipecacuanha is specific. It cures the active or latent dysentery which has caused the suppurative hepatitis and prevents further breaking down of the liver substance. Large doses better than several small ones. Vomiting may be prevented by Chloral Hydrate and Liquor Morphinæ.

DYSENTERY AND HEPATITIS, TREATMENT.—The patient should not eat or drink anything for two hours before and after the dose, but twenty minutes previously he should take 20 grains of chloral. The dose of Ipecacuanha is 30 *grains for the first three or four nights*, reduced to 25 and 20 gradually, a single dose daily being usually sufficient. When the leucocytosis has fallen to 10,000 or less, the temperature has become normal, and the discomfort in the region of the liver has disappeared, the drug may be continued for another week in doses of 20 grains daily. All patients who have had such an attack should abstain from alcohol so long as they reside in India. As a rule diffuse hepatitis precedes the formation of a liver abscess. In hospital practice, in which Ipecacuanha was systematically used, not a single case of dysentery was complicated by hepatitis.—B.M.J. ii./10,2039.

Diarrhœa in the French Army well treated by 0·8 to 1 Gm. of the powdered root, *p.d.*, divided into 5 or 6 doses of 0·2 Gm. Each dose is taken in a warm infusion every two hours. On the day of administration the patient is restricted to a liquid diet and milk is forbidden. The following day he may feed on solids again, with the exception of meat. The diarrhœa is not stopped on the actual day of administration, but ceases on the following day. No longer necessary to remove any patient from duty on account of diarrhœa, and he is not rendered unfit for duty for more than a day. The remedy is well tolerated; it sometimes gives rise to nausea, but rarely to vomiting.—Lehmann, L. ii./15,363.

Off. requires not less than 2% Alkaloids. *For the methods of assay of Ipecacuanha and other chemical data see Vol. II.*

F.I. agreed the root bark only to be powdered, rejecting the woody portion. The powder should have an alkaloidal strength of 2%. FR. CX. also requires 2% alkaloids and directs it to be estimated for alkaloid on a sample powdered as directed under Poudre d'Ipecacuanha; powdering in a covered iron mortar and passing through a fine sieve to the extent of three-quarters of the weight of root taken.—*i.e.*, rejecting the woody portion.

U.S. allows both *Cephaelis Ipecacuanha* (*Rio*) and *C. acuminata* (*Carthagena*) if yielding 1·75% Ether soluble alkaloids.

Ⓟ **Tablets of Ipecacuanha Powder** contain $\frac{1}{20}$, $\frac{1}{10}$, $\frac{1}{4}$ and 5 grains. Ⓟ **Pills** have been prepared salol-coated with a view to their dissolving in the intestine only. '**Stearettes**' *q.v.* are preferable.

Ⓟ ✱'**Membroids**' (T.M. 272337) (Animal Membrane Capsules for dissolving in the intestines) of Ipecacuanha, 5 and 10 grains are useful in the treatment of dysentery.

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* Chronic colitis and chronic dysentery may be quickly cured with the de-emetinised drug. Ipecacuanha contains other substances in addition to Emetine which kill other organisms.—H. Alston, B.M.J. ii./13,1380.

Membroids are also made of Blaud Pill=1, 2, and 3 Pills, and [℗1] with arsenic $\frac{1}{50}$ and $\frac{1}{100}$ grain, of creosote, 1, 2, 3 and 5 minims, and of quinine sulphate 1, 2, and 3 grains, and of santal oil 5, and 10 minims, also santal oil 8 minims, salol 2 grains and methylene blue 1 grain.

℗**Fluidextractum Ipecacuanhæ, U.S.** 1=1 by hydro-alcoholic percolation. Standardised to 2 Gm. Alkaloids in 100 Cc. *Average dose.*—Emetic, 15 minims; expectorant, 1 minim. P. Helv. has Liquid Extract containing 'at least 2% Emetine and Cephaeline.

℗**Extractum Ipecacuanhæ,** Fr. Cx.—Extract the root with 70% Alcohol, and evaporate to firm extract.

℗An **Elixir** has been made with Liquid Extract 1, Alcohol 90% 1, Glycerin 5, Water to 20; may be dispensed with alkalis. *Dose.*—As expectorant, 10 to 30 minims.

℗**Linctus Glycerini, St. M.'s H.**

Ipecacuanha Wine 5 minims, Paregoric 15 minims, Glycerin ½ drachm, Water to 1 drachm.

[℗1] **Pulvis Ipecacuanhæ Compositus.** (Exempted from [℈].)

Syn. Dover's Powder. (*Off.* and B.P. 1898).

Dose.—5 to 15 grains (**0·3 to 1 Gm.**).

Ipecacuanha 1, Opium 1, Potassium Sulphate 8. Is diaphoretic and anodyne; 10 grains at bedtime for an acute catarrh or coryza, followed at once by a hot drink and 5 grains of quinine next morning.—Tilley.

[℈℗1] **Poudre d'ipecacuanha opiacée.**—Fr. Cx. *Max. single dose* 15 grains Max. during 24 hours 60 grains. Is the same but has Potassium Nitrate 4 and Potassium Sulphate 4, *vice* Potassium Sulphate 8.

[℗1] **Tablets** of Dover's Powder, 5 grains (**0·3 Gm.**).

For asthma in children.—The following mixture has been given instead of Dover's Powder:—

Tinctures of Aconite, Belladonna, Drosera, Grindelia and Lobelia of each 15 minims, Extract of Opium 8 grains. *Dose.*—5 to 10 drops in sweetened water.—Pr., June '12,890.

Aspirin and Dover's Powder, see p. 88.

℗**Syrupus Ipecacuanhæ, P.G.V.; (F.I.)**

Ipecacuanha Tincture 1, Syrup 9. ℗**U.S.** orders Fluid extract 7, Acetic Acid 1, Glycerin 10, Sugar 70, Water to 100.

Fr. Cx. has 'Sirop' 1% of Extract made by dissolving Extract 1 in Alcohol 70% 3, and mixing with Syrup 100 intended as an emetic. That of F. I. is not emetic in usual doses.—Fr. Cx.

℗**Tinctura Ipecacuanhæ.**—Fr. Cx.; P.G.V. (standardised to at least 0·194% emetine = $C_{30}H_{44}O_4N_2$), **P. Belg.; P. Hung.**—10% prepared by percolation with Alcohol 70%—as required by F.I.

℗**Trochisci Ipecacuanhæ.**—¼ grain (**0·015 Gm.**) in each, with Simple basis (*Off.*) or Fruit basis (B.P. '98).

℗**Trochisci Morphinæ et Emetin** (Trochisci Tussis) contain Morphine $\frac{1}{40}$ grain with Emetin $\frac{1}{80}$ grain. In bronchial asthma.

℗**Unguentum Ipecacuanhæ et Crotonis.**—Sawyer.

Pulvis Ipecacuanhæ 1, Linimentum Crotonis 1, Adeps Benzoatus 2. A powerful counter-irritant, rubbed on the skin of epigastrium relieves gastralgia.

℗**Vinum Ipecacuanhæ** (*Off.* and B.P. 1898).

Dose.—As an expectorant, 10 to 30 minims (**0·6 to 2 Cc.**); as an emetic 4 to 6 drachms (**15 to 22 Cc.**).

B.P. uses Liquid Extract of Ipecacuanha 1 to Sherry 19. It is better, however, to prepare with detannated wine. Is given in 2 to 3 minim doses to allay the vomiting in pregnancy. U.S. has Fluid extract 1, Alcohol 1, White Wine 8.

Flavoring.—Syl Vanillæ, Syl Cinnamomi; Syrupus Tolutanus.

℗ **Emetina.** *Syn.* IPECINE.—$C_{29}H_{40}N_2O_4$ = 480·481.

Emetine was discovered by Pelletier, 1817. Further details—B.M.J.i./21,59.

The formula of Carr and Pyman as above stated was confirmed by Karrer (1916), who also claims to have discovered independently the formation of Emetine by the methylation of cephaëline.—C.D. Apl. 28/17.

In the stable neutral salts the bases are combined with *two* equivalents of Acid. Basic Salts also exist. Both this alkaloid and cephaëline are lævo-rotatory.

A white powder darkening on exposure. ***Soluble*** in water 1 in 600 at 15·5° C., 1 in 900 at 40° C.—by our expts., January 1924. Soluble also in ether, alcohol, and chloroform.

℗ **Emetine Hydrochloride** P. Jap. IV.; FR. CX. Supp. II. $C_{29}H_{40}N_2O_4 2HCl, 6H_2O = 661·513$.

Dose.—$\frac{1}{100}$ to $\frac{1}{25}$ grain (**0·0006 to 0·0025 Gm.**) *per os* as an expectorant—a crystalline salt. As an emetic *per os* $\frac{1}{12}$ to $\frac{1}{6}$ grain (**0·005 to 0·01 Gm.**) has been given. ***Hypodermically*** in amœbic dysentery and hepatitis $\frac{1}{2}$ to $\frac{2}{3}$ grain. Rogers gives 1 grain of Emetine each day—in *two hypodermic doses* of $\frac{1}{2}$ grain each. *Amœbæ* in the body thought to be killed *in from two to four days.* —Sir C. P. Lukis, B.M.J. i./13,1357.

FR. CX. Supp. II. has maximum dose 0.1 Gm. per dose and per diem. P JAP. 0·05 and 0·15 Gm. respectively.

P.J. IV. requires 'when dried at 100° C. should not lose more than 15% of its weight'—this does not allow for $6H_2O$.

Cumulative Action.—Poisoning may result. Bad effects on kidneys and liver. Experiments made on cats hypodermically seem to show that 1½ grains per day for man should not be exceeded.—H. H. Dale, B.M.J. ii./15,895.

Emetine Hydrochloride 0·12 Gm. intravenously or 1·8 Gm. hypodermically would probably be toxic to a man of 60 kilos. The maximum safe dose for man would be 0·06 Gm. intravenously or 1·2 Gm. subcutaneously. A total dose of Emetine hypodermically even if spread over several weeks is the limit of safety.—Dalimier, Presse Méd. per P.J. i./17,319.

INTRAMUSCULAR injection of Emetine found satisfactory. No pain or swelling.—P. Figdor, L. ii./17,258.

Intravenously $\frac{1}{2}$ grain to $\frac{2}{3}$ grain in 5 Cc. Normal Saline has been given—the best plan in desperate cases.—L. Rogers, Jl. Trop. Med. March 1, 1913, p. 74.

Soluble about 1 in 9 in water, but this is not permanent at 15·5° C.—it is safer to use 20 parts of water at least. Our experiments showed that the addition of a little Hydrochloric Acid throws out a gelatinous precipitate. The acid salt is known to be less soluble.

D. B. Dott confirms this solubility. The 1 in 9 Solution soon becomes cloudy from the formation of crystals. It required three more parts of water to render the salt completely soluble—the solubility cannot be stated until there has been ample time for the salt fully to crystallise.—P.J. ii./17,283.

Injections made with Distilled Water are less irritant than those made with Normal Saline. Solutions in sealed ampoules stand sterilising.—Y.B.P., 1919, p. 12.

Pharmacology of Emetine.—It depresses and may eventually paralyse the heart. It is a powerful gastro-intestinal irritant whether given *per os* or hypodermically. May be source of danger in pathogenic condition.—E. J. Pellini and G. B. Wallace. American Journal of Medical Science, Journal of American Med. Assn., 1916, *67*, 975 per P.J. ii./16,413.

DYSENTERY, TREATMENT OF, BY EMETINE INJECTION.

When amœbæ are taken fresh and vigorous from dysenteric ulcers in the bowel, Emetine and Cephaeline have surprisingly weak action on them. Vigorous amœbæ can be kept crawling about for 2 hours in a 1% Emetine Hydrochloride solution. DIMETHOXY-EMETINE found to be 10 times as poisonous for the amœbæ and not nearly as poisonous for the *animal* as Emetine, but it has no therapeutic effect. The curative value of these alkaloids is proportional not to their action directly on the amœbæ but to their poisonous action on the *patient*. The body of the patient must play an important part and perhaps *primary* part in killing the parasite. The nature of such co-operation between remedy and living tissue is difficult to unravel. —Dale and Dobell, B.M.J. i./22,807. See also Prof. Dixon, B.M.J. ii./22,410 : ***'Emetine does not kill the amœbæ except in the human body.'***

The result may be accounted for by the Italian view that streptococci are the active agent rather than amœbæ.—R. Larkin, *ibid*, 901.

Sir Leonard Rogers found that *hypodermic* injections of this salt were most effectual in dysentery. $\frac{1}{6}$ grain (= about 15 grains of Ipecacuanha) given as a trial in first case,—acute hæmorrhagic amœbic dysentery—with good result Subsequently two doses of $\frac{1}{3}$ grain completely cured *without producing nausea. or vomiting*. Two other cases—one chronic amœbic dysentery of $3\frac{1}{2}$ years' standing and the other acute hepatitis, both cured similarly. In the latter case several $\frac{1}{2}$ grain doses were given. Temperature was promptly reduced. In all cases the giving of Ipecacuanha *per os* was impracticable.—B.M.J. i./12, 1424.

J. A. Tull Walsh states he used Emetine in dysentery with good results prior to Rogers.—See I.M.G., Sept., 1891 ; L. ii./12,1179.

In Calcutta and in Bombay, in the damper parts of India, the amœbic variety of dysentery is the more prevalent. In children about 7, $\frac{1}{3}$ grain doses given successfully.—L. ii./12,1064.

A. Chauffard reported a case of dysenteric abscess opening into the bronchi in which rapid recovery took place. The patient, a healthy man, aged 21 years, contracted dysentery in August, 1911. There were 30 glairy and sanguineous stools daily, also enormous expectoration of chocolate coloured material. After treatment with Serum and Silver Nitrate enemata a temporary cure was effected with a relapse. The liver extended four finger-breadths below the ribs. There were dulness and absence of vocal fremitus and respiratory sounds at the base of the right lung. The leucocytes numbered 49,000, of which 77% were polynuclear. Examination showed an ulcer of the size of a 50 centime piece in the rectum. Under rest and enemata of Dermatol the condition improved slightly. Six subcutaneous injections of $\frac{2}{3}$ grain (0·04 Gm.) of Emetine were given. Each day after injection the expectoration fell, and lung condition improved. After the second injection the sputum became less hæmorrhagic and the temperature normal. The hepatic dome had regained its normal contour and the base of the lung was clear. In five days a hepato-bronchial fistula of five months duration was cured. The result said to be comparable with Quinine in malaria and Salvarsan in syphilis.—B.M.J. i./13,574 : L. i./13,1132,1546.

Amœbic dysentery of $3\frac{1}{2}$ years duration cured. Effect said to be like passing suddenly from Hades to Olympus. Patient had been passing 20 to 30 stools a day. Specific in 36 hours.—L. i./13,1803.

Amœbic dysentery in Egypt treated by $\frac{1}{8}$ to 1 grain hypodermically—majority received this amount thrice per week. Hæmorrhage ceased and pallor disappeared. One case of 4 years standing cured with 3 injections. —E. J. Harpur and W. B. Waddad, L. i./15,255.

Sir R. Ross on the treatment of dysentery. Past experience in India. Ipecacuanha given in massive doses. The first dose usually vomited but the drug tolerated on the second or third. Up to the present, the author states, he is not at all convinced that the drug is of no benefit in *bacillary* dysentery, also. In chronic dysentery the drug was given daily for some weeks. Enemata were used more certainly than in acute dysentery and Nitrate of Silver was a classical drug for the purpose. In amœbic dysentery amœbæ may remain almost innocuous for a time but all amœbæ and flagellates are potentially dangerous. Experience among the troops—British, Colonial and Indian—showed that dysentery was not so prevalent among the latter, showing that a certain amount of immunity is no doubt acquired during childhood. One grain of Emetine Hydrochloride was given as a general rule either in one subcutaneous injection or in two doses morning and evening, then given three days consecutively with the same period intermitted or 5 days on and 5 days off. One week's treatment generally efficacious. A single lethal dose for man, Rogers calculated, is 15 grains. As to the medicinal treatment of running acute dysentery, heaped teaspoonsful of Bismuth Subnitrate are advised 3 or 4 times a day (Deeks treatment in Panama). Tannic Acid 10 grains is a useful addition. To prevent hepatic abscesses which continue to appear for years after attacks, continue Emetine periodically.—L. i./16,1.

In some cases there was subsequent palpitation, breathlessness, arrhythmia and precordial pain. It was a question as to whether these effects were due to the acute infection, excessive smoking or the remedy Emetine (experimentally Emetine has been found to produce ventricular fibrillation.—Levy and Rowntree).—Surgeon-General H. D. Rolleston, B.M.J. i./17,225; L. i./17, 258.

When Emetine fails in dysentery, Decoction of *Simaruba Officinalis* in doses of 6 Gm. in 200 Cc. of water, a Wine made of seeds of *Brucea Sumatrana* or a Decoction of *Ailanthus glandulosa* recommended. *Locally* injections of Thymol 1 in 6000, Silver Nitrate 1 in 1000, Quinine 1 in 1000 advised. Copper Sulphate 1 in 2000, Tannin 1 in 500, Potassium Permanganate 1 in 4000 have also been tried but are of no effect.—Prof. V. Gabbi, L. i./16,523.

Peculiar effects may be produced. In two fatal cases there was inability to swallow after food had reached the œsophagus; hepatisation of the lungs and action on the heart.—Military Surgeon (American) 1917, *40*, 58.—Per P.J. i./17,139.

In acute dysentery irrigation of the large bowel with 0·5% Tannic Acid Solution often better than Emetine As enema in conjunction with Emetine treatment also useful. Tannin 4, Iodoform 3, Sodium Chloride 6, Arrowroot 25, water to 1000. To be given in two enemata in 24 hours. Must be kept in the large intestine for 15 to 20 minutes.—Prof. S. Kartulis, B.M.J. i./16,144.

Emetine does not kill the Cystic Stage of the Parasite.—It kills the amœbæ or active living forms which are present in the tissues of the bowel. The cysts in the fæces are being cast off and only indicate that there are living amœbæ in the bowel producing them. If all the amœbæ are killed, then there can be no further production of cysts; the stools become negative and remain so permanently.—G. C. Low, L. i./17,482.

The Relative Failure of Hypodermic Treatment with Emetine with dysentery carriers is probably to be explained by the entamœbæ being more or less shut off from the circulation and tissue fluids of the patient.

Small quantities (less than 10 grains in total) given hypodermically rarely rid a carrier of E. Histolytica of his infection.

Full courses of the drug (10—12 grains or more) are successful in about one third only of the cases treated.

Re-treatment with equal or larger amounts of the drug—of patients who have already received full courses, offers little hope of success.—Clifford Dobell in Special Report on Dysentery issued by Med. Res. Com. under Nat Health Ins. (H.M. Stationery Office), 1917.

In Salonika forces Emetine in acute dysentery was of greatest use in controlling acute manifestations of the infection but disappointing when used for eradicating the parasites from the system.—Col. A. G. Phear, Proc. Roy. Soc. Med., 1920, Vol. XIII., pp. 57-100.

As diagnostic. If no response within three days, the case is not amœbic dysentery.—B.M.J. i./13,1358.

Liver abscess has been treated by 1½ grains hypodermically daily after successful surgical evacuation.—C.B. Pasley, L. i./15,1076. It may be necessary to repeat the treatment periodically.

Amœbic liver abscess is produced by infection through the portal vein with *E. histolytica*, only very occasionally assisted by bacteria, and is always secondary to antecedent amœbic ulceration of the large bowel, which is clinically active and acute in the multiple variety, but usually completely latent clinically in the more chronic single variety, while such abscesses never occur in relation to bacillary dysentery.—Sir L. Rogers, L. i./22,463,569,677. See also B.M.J. i./22,224,264,345.

Tubercular Hœmoptysis has been treated by 1 grain intramuscular doses with success.

The treatment relieves congestive conditions of the lung generally. Cardiac debility must be alleviated by other means first.—See also B.M.J. i./14,703; and Aubert Bouger and Chauffard, Bull. de l'Acad. de Med., Jan. 20, 1914; P.J. i./14,662.

Sprue treated by Emetine hypodermically and Vaccines.—Sir L.Rogers, L. i./14,1605.

Cholera well treated by hypodermic doses of 0·01 to 0·04 Gm., combined with Camphor injections and Saline.—Renault, I.M.G., July, 1914.271.

Pyorrhœa has been treated by Smith and Barett by local application of ½% solution in the hope of destroying Entamœba buccalis the organism thought to be responsible. In addition ⅛ grain hypodermically daily for 8 days or a dose of ½ grain the first day and then after interval of a day ¼ grain on two successive days. A few drops of Liquid Extract of Ipecacuanha on the tooth brush as a routine measure might be useful—even as a prophylactic, or the following mouth-wash or pigment:

℞ **Pigmentum Ipecacuanhæ et Arsenici.** *Syn.* **Pigmentum Liquoris Arsenicalis R.D.H.**

Ipecacuanha Wine ½ ounce, Glycerin 1 drachm, Liquor Arsenicalis to 1 ounce. *Caution Poison* !—F. B. Bowman, B.M.J. i./16,373. See also Sir L. Rogers, Ind. Med. Gaz., April, 1915.

Good result from a mouth wash of Emetine Hydrochloride ½ grain in water 8 ounces.—B.M.J. ii./18,188.

Typhoid has been treated by Emetine ½ grain hypodermically given as early as possible and repeated every 6, 8 or 12 hours till maximum afternoon temperature is within 1 to 1·5° of normal after which ½ doses until normal. Should not be used as an abortant after the third week of the disease except in very small doses as serious hæmorrhage is likely to be produced.—W. L. Frazier, Med. Rec., March 20th, 1915. See also note under Stearettes of Emetine-Bismuth-Iodide.

Diagnosis:

For Method of Searching Stools and Mucus for Amœbæ, see Dysentery, Vol. II.

Amœbic Dysentery. Difficulty in treatment and diagnosis of chronic cases whose course is often marked by alternating diarrhœa and constipation. Presence of *E. histolytica* cysts in stools can only be verified in about 30% of cases. In a further 40% diagnosis is supplied by use of **sigmoidoscope** and remainder is based on course and history of the case.—P. H. Manson-Bahr, B.M.J. ii./21,1115.

Intestinal parasites found in symptomless carriers—*E. histolytica*, *E. coli*, *Giardia intestinalis*, *Chilomastix mesnili* and *B. coli* found on examination of stools of 120 patients in Jamaica Hospital.—H. H. Scott, per Jl. Trop. Med., Feb. 1/23,49.

Intestinal protozoa endemic in Britain. *E. histolytica* found in a case of ulcerative colitis in a patient who had not been abroad —B.M.J. i/21,276.

Bilharziasis. A total of 14 grains and a further total of 20 grains spread over a long period was not effectual but cure eventually under Antimony intravenously.—A. H. Harkness, B.M.J. ii./20,890.

As much as 0·12 Gm. (single dose) given intravenously in bilharzia. Ten to 12 injections at 3 to 5 days interval will cure, the total amount given being from 0·85 to 1·05 Gm.—Diamantis, B.M.J. i./21,70. *See also* B.M.J.E. i./20,33.

10 intradeltoid injections with 4 days' rest between each.—E. Debbas, Presse Med. d'Egypte., Feb., 1920, per Pres., Feb. 21,48.

Four 3 grain doses every third day intramuscularly sufficient. A child will stand 2½ grains.—'B.H.', B.M.J. i./21,586.

Commence with ½ grain initially intramuscularly for an adult and ⅓ grain for a child and work up to 1 grain for a child of 12. Injections generally given daily for 3 days and then 3 times a week for 3 weeks. Iron and Arsenic as tonic.—F. G. Cawston, L. ii./21,1049.

Japanese Bilharzia disease well treated by Emetine but there may be severe cardiac depression.—F. G. Cawston, B.M.J. ii./21,1031.

Emetine Hydrochloride, ⅛ to ¾ grain, in 1% Phenol solution intramuscularly, on alternate days, eradicates permanently.—F. G. Cawston, Jl. Trop. Med., May, 1922,112; B.M.J.E. ii./22,29.

See also Trolli, Jl. Trop. Med., May 1/23,149.

GUINEA WORM. 17 cases treated successfully by Emetine given intravenously and *per os*.—E. Tournier, per Jl. Trop. Med., Mar. 15/23,101.

ORIENTAL SORE. 2 cases cured in three weeks by 2 injections of Emetine Hydrochloride.—Caliceti, per Jl. Trop. Med., June 1/23,201.

Acute articular RHEUMATISM, resistant to all other forms of treatment, cured by Emetine.—Trolli, per Jl. Trop. Med., May 1/23,149.

MORPHINE HABIT has been treated with Emetine, see **'Morphine Habit.**

Ⓟ **'Sterules' of Emetine Hydrochloride** are prepared 1/6 grain (**0·01 Gm.**), ¼ grain (**0·016 Gm.**), ⅓ grain (**0·02 Gm.**), ½ grain (**0·03 Gm.**), in 15 minims (**1 Cc.**).

Ⓟ **Emetine Stearettes** 1/3 grain. Emetine *per os* in amœbic dysentery gives good effect but not so rapid as hypodermically.

1/3 to 2/3 grains may be given without exciting any great nausea. —Sir C. P. Lukis, B.M.J. i./13,1357. The Stearettes protect the Emetine from the action of the gastric juice.

Ⓟ **Emetine Hydrobromide.**—$C_{29}H_{40}N_2O_4 2HBr,4H_2O = 714{\cdot}401$.

Dose—as for Hydrochloride.

White crystalline salt. ***Soluble*** about 1 in 70 only, of water hence the Hydrochloride should be prescribed in preference. The addition of a little Hydrobromic Acid does not increase or decrease solubility.

Ⓟ **Sterules of Emetine Hydrobromide**, ¼ grain in 25 minims (1·5 Cc). and ½ grain in 40 minims (2·5 Cc.) are prepared.

Ⓟ **Vinum Emetinæ**, 4 grains of the Hydrochloride in 8 ounces of Sherry. Equivalent to Ipecacuanha Wine. *Dose.*—5 to 45 minims (**0·3 to 3 Cc.**).

ℙ **Emetine-Bismuth-Iodide.** $C_{29}H_{40}N_2O_4.2HI.BiI_3.H_2O(?)=1343{\cdot}113$

Dose.—Three grains (**0·2 Gm.**) [= approximately 1 grain (**0·06 Gm.**) of Emetine, or about 60 grains of Ipecacuanha] constitutes the average daily dose given after a full meal or last thing at night. Twelve doses are given in succession to make up the course. A

less quantity, it is stated, may only lead to a relapse. A total of 60 to 70 grains (4 to 4·6 Gm.) may be necessary in some cases.

A brick-red powder containing approximately 30% Emetine. (1 Gm. Emetine-Bismuth-Iodide = 0·4 Gm. nearly Emetine Hydrochloride $C_{29}H_{40}N_2O_4$, 2HCl, $6H_2O$.)

Manufacture. — Solve Emetine Hydrochloride 660 Gm. in water 32,000 Cc. and treat with excess of the following solution :— Bismuth Carbonate 290 Gm., Potassium Iodide 920 Gm., Concentrated Hydrochloric Acid 900 Cc. or *q.s.* to clear and water 16,000 Cc. Collect precipitate, wash and dry at 40° C.

The formula we give for the compound indicates 35·7% of Emetine, but the substance is not a very definite compound—there is chance of loss of Emetine in the washing. *It should contain at least* 30%.

Examination of Commercial Samples, see last Edn., p. 517.

Solubilities.—Emetine-Bismuth-Iodide was introduced under an erroneous view. It is *soluble* in Physiological Acid. We gave details of experiments proving this in our last Edn., p. 517, see also L. i./23,158.

Administration.—Preferably as "Stearettes" or Salol-coated Pills (Keratin coating is of little use). Some, it is true, give it in slipules or cachets, uncoated, without heeding the vomiting. Even when given 'coated' there are often vomiting, purging, abdominal pain and cardiac depression from it.

Uses.—Similar to those of Emetine hypodermically. In particular it was advocated by Du Mez for treatment of *Entamœba histolytica* infected patients. It was said to be effective in removing cysts of the *amœba* from the fæces of chronic carriers, whilst treatment with Emetine hypodermically has in many cases been followed merely by an early recurrence of cyst-passing. (*See also* '*E.P.I.*')

The Medical Research Committee Report on Investigation of Dysentery Cases, reported it cured the majority of carriers. Large quantities are essential —not less than 30 to 40 grains in daily doses of 3 to 4 grains. Given in this form Emetine has generally been successful, even after hypodermic treatment has proved a failure.

Physiological Trials.—Details in last Edn., p. 518.

Histolytica-infected patients treated with the compound in comparison with Emetine Hydrochloride hypodermically. Given *per os* on a full stomach in cachet. 1 grain thrice daily until 36 grains are given. The results surpassed the most sanguine expectations. Specific. Cysts and *amœbæ* vanished from fæces. No relapses; whereas with Emetine Hydrochloride there were 17 relapses out of 24 cases treated. It is harmless to the other protozoa of the human bowel.—C. Dobell, B.M.J. ii./16,612,626.

From the epidemiological as well as the medical standpoint this destruction of the encysted stage of the entamœba is of paramount importance. Hypodermic use of Emetine does not effect this. Best given at 10 p.m.—C. G. Imrie, and W. Roche.—L. i./17,17.

"Carriers" cured—95% of cases. The loose powder in cachets preferred.—M. W. Jepps and J. C. Meakins, B.M.J. ii./17,645.

EMETINE DIARRHŒA.—Within limits this can be aimed at—it was aimed at in the old Ipecac. treatment The bowel is thoroughly washed out—in addition to the specific effect. A few days after the course (12 doses) the stools become normal.—G. C. Low B.M.J. ii./17,484.

Emetine Bismuth Iodide is of value in early stages and is capable of curing about 50% at that period, but when the disease becomes chronic it has proved a failure. Emetine alone in the acute phase is better, followed by Emetine

Bismuth Iodide later. Risk of irritating action of Emetine Bismuth Iodide on the acutely inflamed bowel leading to serious intestinal hæmorrhage if used earlier.—P. H. Manson-Bahr, B.M.J. ii./21,1115.

At times proved so unpleasant to patients that they would not take it.—Sir P. Bassett-Smith, B.M.J. ii./21,1115.

Combination of Tannic Acid 5 grains with the Emetine Bismuth Iodide said to check unpleasant effects.—Sir L. Rogers, B.M.J. ii./21,1115.

A good deal of the disrepute into which Emetine Bismuth Iodide has fallen may be due to the fact that we focus our attention on the one relapsing case that does resist all forms of treatment, and forget the 99 that go their way rejoicing. Chenopodium Oil should be tried in cases resisting Emetine treatment.—G. W. Goodhart, L. i./23,157.

Vomiting, if delayed (four hours after taking E.B.I.) does not mean that it will not be absorbed. It appears to indicate that it is beginning to take effect.—P. Manson Rennie, L. ii./22,1374.

Ⓟ **'Stearettes' of Emetine-Bismuth-Iodide 1 grain (0·06 Gm.), 2 grain (0·12 Gm.) and 3 grain (0·2 Gm.)**

These pass intact through the stomach and dissolve on reaching the alkaline juices of the duodenum and intestines, providing the alkalinity and bile secretion be adequate to effect the chemical reaction necessary. We proved some years ago that Keratin coating is practically useless.

Salol Coated Pills of the same strength are also made.

Major C. D. Roe, D.S.O., 4th Gurkhas, Bakloh, Punjab, India, states (12/7/17) he was completely cured of Entamœba Histolytica dysentery (contracted in the Dardanelles)by Stearettes of Emetine-Bismuth-Iodide.

Combined Treatment by Emetine Hydrochloride 1 grain hypodermically for 5 days and three grain Salol-coated Emetine-Bismuth-Iodide pills daily for 12 days successful. Dilute Hydrocyanic Acid given to check vomiting.—H. L. Watson-Wemyss and T. Bentham, L. i./18,403. See also A. C. Lambert, B.M.J. i./18,116.

Emetine Periodide (termed for short '**E.P.I.**') $C_{29}H_{40}N_2O_4.6I$ =1242·001.

Dose.—In the treatment of amœbic dysentery the compound has been given as a course of 2 grains (**0·12 Gm.**) thrice daily for 15 days, after food, generally in Slipules and in conjunction with Slipules of Exsiccated Ox Bile, 5 grains (**0·3 Gm.**) each, taken simultaneously.

Manufacture. The compound is prepared by the interaction of Emetine and Iodine in a suitable solvent.

It may be mentioned that Alkaloidal Periodides vary according to the methods used in their manufacture. Care was taken to ascertain that the compound used in the investigation detailed below had always the same composition, as indicated by the above formula.

H. M. Gordon and A. B. Prescott, Jl. Am. Chem. Soc., 1890, p.237, prepared two different Emetine Periodides by precipitation on mixing a strongly acid solution of Emetine in water with a solution of Iodine in Potassium Iodide. To one they gave the formula $C_{28}H_{40}N_2O_5,HI.I_7$. We are ***not*** concerned with a hydriodide-periodide.

'E.P.I.' forms a dark purple crystalline powder containing 38·7% Emetine and 61·3% Iodine.

Solubilities.—Insoluble in water and ether, but readily soluble in Acetone, and slightly soluble in Alcohol and Chloroform. Practically insoluble in physiological acid (0·2% Hydrochloric Acid).

Uses.—The use of the compound in refractory cases of amœbic dysentery was the result of some experimental research work conducted by the author at the request of J. Graham Willmore (S.M.O.,

Tropical Section, Ministry of Pensions' Hospital, Orpington). The work was, in effect, a co-operation between a small team of investigators. Compounds manufactured in the chemical laboratory were submitted, with due care, to clinical trials and dejecta were searched in the pathological laboratory for amœbæ and cysts, to demonstrate their effectiveness.

It will be of interest to give a brief résumé of the development of the treatment, as numerous stages were evolved.

At the commencement, the 'classical' administration of a course of Emetine Bismuth Iodide and Emetine Hydrochloride intramuscularly was in vogue—and had led to disappointment.

Willmore, in his paper on the subject, communicated to the Royal Society of Tropical Medicine and Hygiene, London, May, 1923, says that no detailed account need be given of accessory treatment by 'Alcresta,' Simaruba, Ravaut's Paste, Bismuth, irrigations of Gallic and Tannic Acids, Salvarsan, Oleum Chenopodii, Antimony, etc., as, while all these agents may have their uses in individual cases, and be even markedly beneficial in some, he is convinced that their action is but palliative, and that efforts for radical cure must, for the present at least, centre round emetine in some form or other. Ipecacuanha, in powder, pills, cachets and membroids, in massive intensive courses, and in small doses over a period of months, has not, he adds, justified the claim that it succeeds where emetine preparations fail. Nor has the intensive treatment by 2 grains of Emetine Hydrochloride hypodermically daily, alternating with 30 grains of Ipecacuanha powder, and combined with Emetine-Bismuth Iodide, given any better results than the standard course of 10 grains of Emetine Hydrochloride hypodermically and 60 grains of Emetine Bismuth Iodide.

In the course of the investigation, upwards of 400 cases were dealt with—cases, it should be remarked, that had been under treatment, many of them for years, with every possible known type of medication.

Without going deeply into figures, the following may be cited :—

		Per cent
1.	Of 358 cases treated by emetine and emetine bismuth iodide, 99 were presumably cured after the first course	= 28
	259 relapsed	= 72
2.	Of these 259 cases, 183 received a second course :—	
	36 were presumably cured	= 20
	147 relapsed	= 80
3.	Of these 147 cases, 59 received a third course :—	
	3 were presumably cured	= 5
	56 relapsed	= 95

These 56 received a *further* treatment, as above, and so on with equally disappointing results.

As time went on, the cases curable by Emetine Hydrochloride hypodermically, Emetine-Bismuth Iodide and Ipecacuanha became eliminated, so that at present practically only the 'insoluble residue' reaches this hospital, after filtration through most of the clinics and hospitals of the country. Consequently, it has become imperative to try and find out some new method of treatment, as men who have

spent an aggregate of years under treatment by Emetine and Emetine-Bismuth Iodide—with resulting relapses after as much as ten courses of Emetine and eight of Emetine-Bismuth Iodide, with Ipecacuanha literally *ad nauseam*—do not regard with much favour or confidence the proposal to repeat methods which their experience has shown them to be futile. Further, the treatment is exceedingly unpleasant and depressing, and not altogether devoid of danger.

Pathology. The 'essence' of the pathology of amœbic dysentery is a primary degeneration of the submucous layers of the intestine of the large bowel, due to their digestion by a proteolytic enzyme secreted by the amœba in its vegetative state only. It is not an inflammation, and no antibodies have yet been demonstrated in the blood; but a certain amount of cicatricial fibrosis eventually occurs, resulting in the amœbæ becoming "dug in" in nests—where they are protected against antagonistic substances in the lumen of the bowel or in the blood and lymph streams; and it is obvious that the human host can, under certain conditions which are not yet understood, elaborate anti-amœbic substances, by virtue of which spontaneous recovery may take place, without treatment. It may even occur when the amœbæ reach the liver, as long experience has shown, that many cases of recurring fever, often resembling malaria, are due to attacks of amœbic hepatitis in which spontaneous recovery takes place without "abscess" formation, and without specific treatment. Even an abscess may heal spontaneously.

Now, in protozoal diseases, drugs are thought to act by virtue of their parasitotropic or their organotropic properties, or by a combination of the two. When emetine was first introduced it was thought to act directly on the amœba and to kill it, *i.e.*, that it was preponderatingly parasitotropic.

It is now realised that we do not know how Emetine acts. This much only we know: that the *collaboration of the human host is necessary to produce an amœbicidal result*, that the *E. histolytica* is the only common protozoal parasite of the bowel to be susceptible to Emetine, and that other drugs which are more amœbicidal then Emetine *in vitro* are useless in their clinical application to man.

Granting, for the sake of argument, that the *E. histolytica* produces proteolytic enzyme, does the human body produce an anti-enzyme which causes either destruction of the amœbæ, or, in a lower concentration, their encystment? Does the mechanism of the Emetine effect depend upon this enzyme acting as a link, or sensitizer? Or is it the anti-enzyme which has this property? Emetine is most powerful in untreated, early, acute clinical dysentery and in hepatitis—two conditions in which encystment does not occur, and in which the vegetative amœbæ are at the zenith of their functional activity; and, in consequence, secreting to their fullest this proteolytic enzyme, which gives them, alone among the amœbæ, their peculiar pathogenicity.

Is it not at least suggestive that the *E. histolytica* should be, not only peculiar in its susceptibility to the action of Emetine, but most susceptible at this particular stage?

Does the anti-enzyme of the host combine with the enzyme to produce an inert substance, and so remove the link by which the amœba is sensitized to the emetine, giving it time to encyst?

Were we able to say why an *E. histolytica* never encysts in the liver, and why it apparently cannot exist in the vegetative form in the small intestine, we should be on the high road to curing all cases of amœbic dysentery. Is it because no anti-enzyme is produced in these situations? If so, how can we prevent its formation in the colon?

All the above may suggest a possible explanation as to why encysted amœbæ are difficult to eradicate, but there are exceptional relapsing cases, completely refractory to Emetine in any form, and in them the vegetative *E. histolyticæ* alone are constantly present—never the encysted, even in the quiescent intervals.

These cases are not refractory to Emetine only; they are incurable by any means at our disposal. "Bayer 205," Yatren, Conessine

intravenously, Conessine-Bismuth-Iodide, Naphthalene Tetrachloride, Oleum Chenopodii, 'T.C.P.', by the mouth and per rectum, Dimol, Kerol, Proposote, Creosote, Turpentine, etc., and Kurchi, in decoction, paste and tabloids, were all tried without success.

The disease in these cases, curiously enough, does not seem to make such inroads on health as one would expect; patients do not develop liver abscess—if it threatens, a course of Emetine Hydrochloride hypodermically seems to prevent it—and they never develop the fulminating type of the disease, resulting in *gangréne en masse* of the colon, which is frequently seen among untreated Orientals.

It would seem to be at least desirable to attempt always to bring the alkaloid and the amœbæ into direct contact. Wenyon and O'Connor endeavoured to attain this by giving Emetine Hydrochloride *per os* in salol-coated pills. Later came the introduction of Emetine Bismuth Iodide, which for long maintained the myth that it was not decomposed in the stomach, only in the intestines; but one has only to shake up some of the drug in an excess of dilute hydrochloric acid—as pointed out by Martindale—filter, and add a little Tanret's reagent to the clear filtrate to obtain a voluminous precipitate.

One must not forget that any medicine given *per os* has to travel twenty-five feet through a digesting and absorbing tube before it can begin to be useful, and then to exercise its effect equally over any and every point of another minimum of six feet. If administered in too hard a form it may pass through unchanged; if in a form too easily broken up it may be dispersed, absorbed or decomposed before it even gets to where it is wanted; and when it arrives in optimum condition and quantity at the beginning of the scene of its labours, it only too often becomes exhausted before reaching the end, where it may be equally, or even more urgently, needed than it was at the beginning.

Further, it must be capable of *slow* absorption and penetration, as the amœbæ are usually not directly accessible from the lumen of the bowel.

Hence it seemed desirable to supplement medication *per os* by medication per rectum, more especially where preliminary sigmoidoscopy—all treatment being now, as a matter of routine, controlled by sigmoidoscopy—showed ulceration of the lower bowel.

A form of Emetine, soluble in Ether and Olive Oil, would meet the first requirements. It was also suggested to Martindale that, if possible, a new combination of Emetine for oral use should be found, which could be depended upon to be stable, not decomposed in the stomach, not absorbed unnecessarily high up in the small bowel, and to liberate its available Emetine in active form actually in the diseased neighbourhoods.

The first part of the work resulted in **Emetol** (*Willmore-Martindale*), a solution of Emetine base, 1 grain (0·06 Gm.) in 2 drachms (8 Cc.) of Olive Oil, for rectal administration. Of this, 2 drachms are added to 4 drachms (15 Cc.) or 6 drachms (23 Cc.) of Ether and 8 ounces (230 Cc.) of Olive Oil for use.

Chemical Note. Emetine base is apt to resinify and turn reddish brown on keeping. It is better to make it "in one's stride," from a calculated quantity of a salt, e.g., the hydrochloride. This is dissolved in a separator in sufficient water (solubility about 1 in 9). The necessary amounts of Chloroform and alkali are added. The clear chloroformic solution is separated, washed with water, evaporated on the water bath and the base obtained is

dissolved at once in the oil solvent. This produces a clear solution of fresh unaltered Emetine.

This is injected slowly—after a preliminary lavage—into the bowel, the patient being maintained, by the aid of bed-blocks and pillows under the hips, in as "inverted" a position as possible. Injections are usually given every other day, six to twelve completing a course. They are not disliked by the patient and no untoward effects have been observed. The odour of Ether appears in the breath about five minutes from starting the injection, whether given per rectum or through cæcostomy or appendicostomy openings.

Sigmoidoscopy has confirmed the good effects of the treatment *in the areas which it can reach*; but as the addition of Bismuth and radioscopy showed that it does not seem to travel farther than the distal third of the transverse colon, it naturally has no effect on infection of the colon proximal to this limit. A more voluminous enema is not usually tolerated.

That the absorption of the Emetine is really occurring, slowly and continuously, is, in all probability, proved by the fact that when 10 grains of quinine base were administered in ether-oil to a cæcostomy case, the alkaloid first appeared in the urine in four hours and quinine was still present in twenty-four hours; whereas 10 grains of quinine hydrochloride administered in the same way, but dissolved in 8 ounces of water, first showed in the urine in under two hours, and the drug was completely eliminated in twelve hours. Years ago, in Egypt, the effect of lavage by watery solutions of Emetine salts, in doses up to 5 grains to 1 ounce, were tried, but such disappointing results were obtained that they were abandoned.

The search for a suitable compound for use *per os* presented greater difficulty.

Paremetol (*Willmore-Martindale*).

Dose.—1 to 2 drachms (**4 to 8 Cc.**) *per os.*

A solution of Emetine Oleate 1 grain (**0·06 Gm.**) in Liquid Paraffin 2 drachms (8 Cc.). Doses of 1 to 2 drachms, every night for twenty nights, in a tumbler of soda water containing 1 drachm of Sodium Bicarbonate, were given, sometimes preceded by a sedative, Morphine, Opium or Belladonna. It required the same precautions as Emetine Bismuth Iodide for its administration, and was apparently more effective—in numerous cases there was an apparent cure—but it was found to be too nauseating and it was dropped. Next were tried:

Pastils of Emetine Oleate, containing $\frac{1}{4}$ grain (**0·015 Gm.**) of Emetine Oleate, as also,

Pastils of Emetine Oleate Compound, containing Emetine Oleate $\frac{1}{4}$ grain (**0·015 Gm.**), Bismuth Carbonate 5 grains (**0·3 Gm.**) and Cinnamon 3 grains (**0·2 Gm.**). These were better tolerated than the preceding.

Formagules of Emetine Oleate as also of Paremetol.—Containing $\frac{1}{4}$ grain (**0·015 Gm.**) Emetine Oleate in Olive Oil and Liquid Paraffin respectively.

These formalised capsules would pass through the stomach and disintegrate in the alkaline intestinal fluid, liberating the Emetine, but though they obviate vomiting, they would not appear to be very effective.

Chemical Note on Emetine Oleate. In preparing this, or other 'salts' of Emetine, care must be taken to use the correct quantity of acidic radical to produce the neutral compound in question, *i.e.*, one molecule of Emetine base with two equivalents of acid. Emetine Oleate contains approximately 50% of Emetine.

Last of all, **Emetine Periodide** was prepared by Martindale, and given an exhaustive trial.

This compound, as already stated, is practically insoluble in physiological acid, even on keeping in the incubator at body temperature for two or three hours. If, on the other hand, a suspension of E.P.I. in 1% Sodium Hydroxide (or 2% Sodium Carbonate) be exposed to body temperature for a short time it can be shown that Iodine is removed from some of the 'E.P.I.' as Alkali Iodide, with simultaneous liberation of Emetine base.

It may be remarked, as germane to the matter, that the Ipecacuanha alkaloids are believed to stimulate biliary secretion. This secretion is, of course, strongly alkaline.

It is of peculiar interest that the alkaloidal *base*, Emetine, is so soluble in aqueous media. In this respect it differs from the generality of alkaloids. A determination showed that the base is soluble 1 in 600 of water at 15·5° C. (but less soluble at 40° C. 1 in 890).

The following solubilities of Emetine base, which we took, are also of interest; In 2% Sodium Carbonate at 15° C., 1 in 1350; at 40° C., 1 in 2270.

The next practice was to give :—

Emetine Hydrochloride 1 grain daily, intramuscularly, and 1 drachm of Emetol daily, per rectum; each for six days on alternate days.

Concurrently, 2 *grains of Emetine Periodide are given in Slipules per os three times daily for fifteen days with* 5 *grains of Fel Bovinum thrice daily* in separate Slipules.

The periodide is given after food.

So far, Emetine Periodide appears to be by far *the most efficacious and, at the same time, the least toxic of all the Emetine Preparations which have been tried,* and I think it may well supersede Emetine, Bismuth Iodide for standard oral administration, just as Emetol with Ether Oil may supplement Emetine Hydrochloride given intramuscularly, except for amœbic hepatitis, where the superiority of the older method remains unchallenged.

Emetine Periodide has the greater advantage of allowing an intensive course of 90 grains to be given in the short period of 15 days, and, if necessary, this may be repeated after about 10 days' interval; compared with E.B.I., it therefore shortens the period in hospital, and hence makes for economy.

It does not cause nausea, vomiting, depression and weakness, which usually attended the use of E.B.I. No cardiac dilatation, no emetine rash or desquamation and no neuritis, following 120 grains given in 20 days, have been noted. It seems to be at least as effective as Emetine Bismuth Iodide—if not more so—though it is premature to offer any opinion as to the permanency of the presumed cures. On the other hand, it is only fair to remember that the cases treated

with Emetine Periodide all come under the category of the "insoluble residue," *which has proved refractory to all the known standard methods of anti-amœbic treatment.*

One has every reason to think that E.P.I. evokes the cooperation of the tissues, according to present belief, in combating *E. histolytica* infection.

To summarise :—

1. Sigmoidoscopy should be performed with the utmost care, always without an anæsthetic, the instrument being guided by the eye. It is encouraging to watch amœbic ulcers healing under the influence of treatment; but it is dangerous to rely entirely on these findings in making a prognosis. A man may, on admission, reveal a mucosa studded with amœbic ulcers, and, after a course of treatment, not an ulcer nor a pin-point of submucous infiltration may be visible. Only some 30 cm. of the bowel can be seen with the instrument; and if an infected cæcum be left—the existence of which may be indicated by definite tenderness on palpation or by persistent facial pallor—that man is sure to return with a mucosa in as bad a condition as when he was first admitted. The infection appears to trickle down the bowel.

2. If any benefit is to accrue from treatment it will be apparent quickly, and nothing is ever to be gained by pushing treatment that does not show early results, clinical if not protozooscopic.

3. Emetine in any form is a poisonous drug, and extreme care is always necessary in its administration. Different individuals vary greatly in their susceptibility, the utmost caution being urged in all cases where the myocardium is affected by such diseases as malignant tertian malaria, severe influenza, pneumonia, diphtheria, etc. Patients must be kept at absolute rest during its administration in concentrated form.

4. Surgical measures, such as appendicostomy and cæcostomy, may be required to save life in exceptional cases but they are not followed by a greater percentage of ultimate cure.

FURTHER PREPARATIONS
tried in the above investigation.

Ipecacuanha.—In bolus, in cachet, in membroids, etc., in intensive doses of 30 to 45 grains a day, in smaller doses for months—and **Alcresta** have already been referred to. They were even less effective than Emetine Hydrochloride intramuscularly and Emetine Bismuth Iodide.

Ravaut's Paste is undoubtedly a useful adjunct in many cases, but it seems to keep the disease in check only as long as it is being regularly taken, and to have no real curative value.*

It has the composition :—

Bismuth Carbonate 100, Wood Charcoal 100, Ipecacuanha 4 to 6, Syrup 100, Glycerin 100.

Pastils of Ravaut's Paste were made, each equivalent to half drachm, *i.e.*, two for dose. They can be swallowed whole, and have been well tolerated.

Decoction of **Simaruba** and **Granatum** was also ineffectual.

Kurchi Bark. A decoction of this bark and in compressed form has been used very extensively, and is considered of real value. It does not eradicate the infection but it at least keeps the amœbæ under control in all but the exceptional cases mentioned.

Activated Quinine (freshly activated with Potash prior to use) was tried as enema but in all of 22 cases there was relapse.

It is often of value when combined with treatment *per os.*

In the DISCUSSION, Sir Percy Bassett Smith said that examinations of new entrants at Haslar, in the Navy, showed that about 12% of them had cysts.

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* In dose of 2 to 10 tablespoonsful on the first day; second day a capsule containing 0·1 Gm. Novarsenobenzol, third day the paste, and so on alternately for 10 to 20 days. P. Ravaut (Paris Med., Aug. 16/19, p. 125., Abst. Pres., Oct. 20, p. 354) reports: In amœbic dysentery there was no vomiting. Appetite improved.

It seems unnecessary to put these cases through course after course of a drug which is debilitating.

G. C. Low said that it is the class of chronic resisters that is troublesome. He agreed with Willmore that cases refractory to Emetine are refractory to other drugs. He had tried 'E. P. I.' on six cases, most of them chronic resisters, and four of these were apparently going on satisfactorily, as they had not reported themselves again. Two had relapsed: one with well-marked signs of hepatitis and threatening liver abscess (*Entamœba histolytica* cysts in stools); the other parasitically, eleven days after cessation of treatment (*E. histolytica* cysts in stools).

One of the four had been free both clinically and parasitically for two clear months, but as she had had similar quiescent periods after E. B. I. she would probably relapse again later.

A. Castellani had had the opportunity of seeing and following a number of the cases referred to in the investigation and he was able to confirm Willmore's statements. He had used 'E. P. I.' in private practice on a fairly large scale and results had been equally satisfactory. It does not cure every case of chronic dysentery, but it is an extremely useful drug. He, in fact, regarded it as the best drug we have for the internal treatment of amœbic dysentery. From the practical point of view, he regarded its introduction as marking the greatest advance in the treatment of chronic amœbiasis since Rogers first introduced Emetine hypodermically.

C. Morley Wenyon said he was convinced that E. B. I. gave no better results than Emetine itself. He did not agree with Etherised Emetine injected per rectum to penetrate the shell of the cyst, and drew analogy with the egg of the ancylostome. One could not treat ancylostomiasis by killing the egg. He remarked that he was not quite certain that the condition of the intestine in these cases is entirely due to *E. histolytica*. It seems possible that the intestine which has become ulcerated as a result of amœbic infection is kept inflamed by bacteria.

P. H. Manson Bahr had tried E. P. I. in three chronic resistant cases. One relapsed in 50 days, one had remained free from symptoms for three months. It had been observed at the Hospital for Tropical Diseases that cases in which Emetine Bismuth Iodide produced diarrhœa were more liable to be cured than were those in which this treatment caused no obvious intestinal disturbance. He thought the irritant action in part explained its effect on the disease. The essence of the action of Emetine upon the entamœbæ depends upon whether it is a direct poison to the organism or not. Wenyon thinks it is not a direct poison. Sellards, however, thinks it has a direct action on the tissues—as a result of his experiments with kittens and cats. The fact that Emetine has no effect on the cat is explicable, because amœbic dysentery in that animal is a very acute disease, and usually kills the cat before the Emetine has had time to act. He had been giving Emetine per rectum to resistant patients with some hope. It causes considerable disturbance. Sellards says it must be given in sufficient strength, and in the maximum dose that can be tolerated, *e.g.*, 4 or 5 grains of Emetine Hydrochloride in 16 ounces of water.

T. A. Henry spoke regarding alkaline Quinine injections. Major H. C. Brown had recently found that Conessine, the alkaloid of Kurchi Bark, was equally as inhibitory to the growth of free-living amœbæ as was Emetine. Since then it has been found that the toxicity of Conessine in vitro to certain protozoa is considerably increased in presence of alkali. To the protozoa used in the experiments Quinine Bihydrochloride was only slightly toxic, neutral Quinine hydrochloride more toxic, and Quinine base still more so, whilst the maximum is reached when Quinine base is applied in presence of alkali. If the toxicity of alkalinised Quinine to amœbæ is taken as 1, then Emetine is 5 times and Conessine is 14 times more toxic. It was therefore thought that Quinine base in alkali might be worth trying, Quinine being a harmless substance to begin with, and the results, so far, have been promising. It is probable that the other two alkaloids might be tried under the same conditions.

G. B. Price inquired as to efficacy against other parasites, *e.g.*, Lambliæ.

Sir P. Bassett Smith remarked that Bayliss in his '*Physiology*' expresses doubt as to whether there are such things as anti-enzymes, but there is little doubt that Emetine has to attack the parasite through some secondary body product.

J. G. Willmore, in reply to Sir Bassett Smith, said that all cases were clinically ill; he had had no instances of carriers without symptoms of illness. He knew many people had been found in England and elsewhere, who were never ill with dysentery, and yet were found on examination to be carrying these cysts. There is some difference between the cases who are ill and the cases who are carriers without even manifesting illness.

As to *E. histolytica* being the only protozoon touched by Emetine, he had said " in the intestines "; he was not referring to anywhere else. As for the irritant action of the drug being an advantage, he could not agree.

He had had a case recently—admitted for strongyloides infestation. He had had dysentery a year before. After a dose of Ol. Chenopodii, an acute amœbic relapse supervened. He was given E. P. I. and his stools repeatedly examined. *E. histolytica* never reappeared, though the worms did; this as a result of repeated examinations of stools after repeated doses of Oleum Chenopodii—Carbon tetrachloride finally cleared out the worms.

On the question of cysts, he said he was a pupil of Dr. Wenyon in this matter, and he remembered his teaching him in 1916 that the cysts came from vegetative amœbæ; but he did not see why a cyst should not be produced from a vegetative amœba in the cæcum, in man at least, and when it gets to a situation lower down, re-develop. That, he thought, was the most reasonable explanation of those cases which are affected higher up and relapse lower down; especially if ulceration is seen with the sigmoidoscope, then none after treatment, and the patient comes back after some months with the disease as bad as ever in the " cured " area.

He was sceptical about accessory inflammation. Streptococci may be found—as may B. coli—but that is not evidence of causality; the ulcers heal up too quickly for accessory germs like streptococci to have anything to do with it. Without any other treatment than the specific anti-amœbic drug, administered subcutaneously or intravenously, in some instances, the ulcers will heal. If only one can remove what is spoiling the gut, there is much quicker healing than a burn of the hand heals. The mucosa has a high degree of natural immunity to intestinal bacteria.

With regard to Manson Bahr's remarks, he had given aqueous solutions of Emetine hydrochloride per rectum in some of the cases. One man's ulcers were low down and could be seen, and nothing had any effect on them, including Emetine in every form—the watery solutions of the salt and the oily solutions of the base.

Quite recently (1924), in view of the optimistic reports in the French Medical Press (*e.g.*, E. Marchoux, Jl. Trop. Med. July 2/23,237; Nogue, *ibid.* Nov 1/23, 336), trials have been made with **Acetyl-amino-hydroxy-phenyl-arsonic Acid.** *Syn.* STOVARSOL.

As will be seen, this is of undoubted benefit in certain instances, but on the whole cases were more apt to relapse after it than after Emetine Periodide. Of 28 men treated with 8 grains *per os*, in 4 grain Tablets morning and evening daily for 10 days

9 have remained clinically well and protozoologically clear (after 6 months) .. ..=32%
19 have relapsed or not responded .. ..=68%

On the other hand, by combining the two drugs—giving 6 grains of Emetine Periodide and 8 grains of Stovarsol on alternate days, 10 each—the results so far obtained have been much better than with either drug singly. Of 26 men so treated

19 have remained well and protozoologically clear ..=73%
7 have relapsed or not responded .. ..=27%

Of course, these figures are provisional only, since experience teaches one to expect a greater proportion of relapses in the future. It may be necessary to repeat the course.

When hepatitis is present, Emetine Hydrochloride hypodermically is combined with the above, and when sigmoidoscopy shows active changes, either Emetol in Ether-oil or activated Alkaline Quinine is given *per rectum* in addition.

The claim that Stovarsol* cures *lambliasis* is absurd and may be dismissed at once; so far nothing has been found to eradicate this infection *in vivo*, and the best palliative treatment is still rest in bed, a milk diet and a simple Bismuth and Paregoric mixture with carminatives. Further, since fractional

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* The same is true of CCl_4.

alysis shows that complete gastric achlorhydria* is usually present in
nbliasis severe enough to cause symptoms, it seems illogical to expect
tter results from medicines given by duodenal tube.—J. Graham Willmore,
24. (*Lamblia* ref.—E. Marchoux, Jl. Trop. Med. Sept. 15/23,295).
Sir Wm. Willcox states he has also used 'E. P. I.' with success.

Methyl-psychotrine 0·015 to 0·033% and *Emetamine* 0·002 to 0·006%, two
w alkaloids in Ipecacuanha, isolated by F. L. Pyman, P.J. i./17,360; C.D.
l. 28/17. The former has no effect on *E. Histolytica* nor *Lamblia* infections
M. W. Jepps & J. C. Meakins, B.M.J. ii./17,645.
Emetine and Iso-emetine are apparently stereo-isomerides, although the
empt to convert one into the other has not been successful. Iso-emetine is
e methyl ester of Isocephaeline.—F. L. Pyman, J.C.S.T., 1918, 113,222.

Cephaëline. $C_{28}H_{38}N_2O_4 = 466{\cdot}46$.
A crystalline alkaloid, less soluble in ether than emetine, but soluble in
istic alkali solutions, and also darkens on exposure.
By Methylation it is converted into Emetine *q.v.*
Cephaeline Hydrochloride, $C_{28}H_{38}N_2O_4 2HCl = 539{\cdot}36$.
In doses of $\frac{1}{12}$ to $\frac{1}{6}$ gr. said to be more powerful emetic than Emetine.

Emetin—Extractive.
Dose.—Expectorant $\frac{1}{16}$ to $\frac{1}{10}$ **(0·004 to 0·006 Gm.)** emetic $\frac{1}{2}$ to
grain **(0·03 to 0·06 Gm.)**, in pill or solution. An extractive sub-
ance soluble in water; must be distinguished from Emetine.
Alcresta (T.M. 368822) **Tablets of Ipecacuanha** (stated to be subject of
patent but the No. 450204/1912 on the package is incorrect).
Dose.—Each tablet contains the alkaloids (emetine and cephaëline held in
sorption by kaolin) from ten grains of Ipecacuanha. Ten or twenty tablets
ay be given in a day without vomiting or nausea. The alkaloids are thought
be liberated only in the alkaline intestinal secretions—thus preventing
miting. Suggested for use in dysentery and endamœbic pyorrhœa. The
eparation was tested at the Liverpool School of Tropical Medicine—37·5%
the cases were unsuccessful—*i.e.*, patient continued to pass cysts during
d after treatment or relapsed after treatment ceased.—See Ann. Tropical
edicine & Parasitology.—Vol. XI. No. 1, June, 1917.

JABORANDI FOLIA.

Dose.—5 to 60 grains **(0·3 to 4 Gm.)** of powder. Fr. Cx. Max.
ngle dose 45 grains, max. during 24 hours 45 grains.
The dried leaflets of a shrub. The variety known as *Pilocarpus*
icrophyllus or Maranham Jaborandi is mostly employed. Jaborandi
as introduced into Britain by the late W. Martindale. Contains
locarpine up to 0·5% (U.S. not less than 0·6%). There are
merous other varieties. *For details and Assay, see Vol. II.*
Uses.—A powerful sudorific and sialogogue; after a time a large
se acts as an emetic, contracts the pupil of the eye, and causes
proximation of vision. These properties are principally due to
locarpine contained in it. For other constituents, *vide Vol. II.*
The sweating and salivation from a full dose persist for 2 to 5
urs, the symptoms come on in about 10 minutes after taking the
se if external conditions are favourable. Hypodermically the
kaloid acts in 3 to 5 minutes. A reduction of temperature occurs.
borandi and pilocarpine have been used in a variety of diseases,

* The natural corollary of this was to give Dilute Hydrochloric Acid in
ses of 1 to 1½ drachms. It had no effect, clinical or other.

most successfully in asthma, diabetes, dropsy and uræmia, and as antidotes to belladonna and opium poisoning. Children proportionately are not affected by the drugs so much as adults. Externally promotes growth of the hair, *e.g.*, in alopecia.

Small doses ($\frac{1}{20}$ grain) check night sweating of phthisis and do not over-dry the skin.

Puerperal convulsions have been treated by injection of solutions.

Pilocarpine has been found to relieve nerve deafness, also itching of jaundice and assists passage of gallstones.

Pneumonia is treated by hypodermic injections of $\frac{1}{10}$ gr. and more.

In alopecia $\frac{1}{6}$ grain of the nitrate increased to $\frac{1}{3}$ grain injected into the scalp is recorded to have made hair grow.

In tinnitus aurium (acute labyrinthine) Pilocarpine hypodermically is of value in suitable cases.

Bronchial asthma. An almost constant sensitiveness to Pilocarpine and Epinephrin is said to be common to all sufferers. Cases reacting to the latter were relieved by 0·25 Cc. of 1 in 1,000 solution. Small doses should be used.—B.M.J.E. i./21.85

Pilocarpine which causes marked activity of most other glands has no effect on the secretion of the mammary gland.—K. Mackenzie, Jl. Exp. Physiology, Dec. 1911; see also Pituitary Extract.

Antidotes to Jaborandi and its preparations :—

After evacuating the stomach, give Tannin, then Atropine Sulphate or Tincture of Belladonna; *vide* also Poisons and Antidotes.

Strangury may be caused by Pilocarpine in too large a dose.

℗**Extractum Jaborandi Liquidum** (B.P. 1898), *Syn.* **Liquor Jaborandi.** 1=1 of leaves; in 45% Alcohol.

Dose.—5 to 15 minims (**0·3 to 1 Cc.**). ℗ **Fluidextractum Pilocarpi, U.S.** is similar.

℗**Tinctura Jaborandi** (B.P. 1898). 1 in 5 of 45% Alcohol.

Dose.—30 to 60 minims (**2 to 4 Cc.**).

Fr. Cx. 1 in 5 by weight, Alcohol 60%. *Max. single dose.*—½ ounce approximately. Maximum during 24 hours the same.

℗**Linimentum Jaborandi.**

Jaborandi Tincture 1, Cantharides Tincture 1, Soap Liniment 4.

For hair falling off, to apply with friction.

ℙ1 **Pilocarpina,** $C_{11}H_{16}O_2N_2$=208·199. Fr. Cx. The pure alkaloid is a colourless syrupy dextrorotary liquid. Slightly soluble in water. Soluble in alcohol, ether, chloroform and benzol.

Uses of Pilocarpine and its Salts. *See* Jaborandi *antea.*

ℙ1 **Pilocarpinæ Hydrochloridum,** P.G.V., U.S., Fr. Cx. $C_{11}H_{16}O_2N_2HCl$ = 244·667.

Dose.—$\frac{1}{20}$ to $\frac{1}{3}$ grain (**0·003 to 0·02 Gm.**) by mouth or hypodermically. In minute granular snow-white crystals, slightly deliquescent and very soluble in water. M.pt. between 195 and 199° C.

Uses.—*Vide antea.* In pneumonia 20 minims of 1% solution on sugar or in water have been given. In hiccough, ten minims every three hours, is said to be useful.

℗**Hypodermic Tablets contain** $\frac{1}{6}$ **grain (0·01 Gm.).**

℞ **Pilocarpinæ Nitras.** $C_{11}H_{16}O_2N_2.HNO_3 = 271{\cdot}215$.

Dose.—$\frac{1}{20}$ to $\frac{1}{5}$ grain (**0·003 to 0·012 Gm.**). FR. CX. : *Max. single dose* $\frac{1}{3}$ grain approx.

In minute white granular snow-like crystals, but may be obtained in large white prismatic crystals. ***Soluble*** 1 in 8·2 of water, but very slightly in cold alcohol. This salt, preferred in England, was the first pure preparation of Pilocarpine prepared,—it was obtained by the late W. Martindale from an alcoholic solution.

The ℞ **Phenate** and **Salicylate** have similar dose and properties.

Ⓟ **Tablets** of Pilocarpine Nitrate $\frac{1}{10}$ and $\frac{1}{5}$ grain to be given *per os*.

Ⓟ **Guttæ Pilocarpinæ Nitratis 0·5 or 1%. R.O.H.**

Used to contract the pupil of the eye. Ⓟ '**Sterules**' are prepared.

Ⓟ **Injectio Pilocarpinæ Nitratis Hypodermica R.O.H.**

Dose.—2 to 6 minims.

Pilocarpine Nitrate 1, Distilled water 20.

G.H. has the following. 'Remove the patient's night-shirt, wrap closely in a warm blanket, and cover with two more blankets. Put hot water bottles to his feet, and give hot drinks freely. After sweating has ceased, remove blankets gradually, dry the skin and leave him between warm dry blankets.'

Ⓟ **Hypodermic Tablets,** $\frac{1}{10}$, $\frac{1}{8}$, $\frac{1}{6}$, $\frac{1}{4}$, $\frac{1}{3}$, and $\frac{1}{2}$ grain (**0·006, 0·008, 0·01, 0·016, 0·02 and 0·03 Gm.**).

Ⓟ **Sterules, Hypodermic,** $\frac{1}{10}$, $\frac{1}{4}$, $\frac{1}{2}$ grain.

Ⓟ **Ophthalmic Discs,** $\frac{1}{500}$ grain, combined with gelatin.

Ⓟ **Lotio Pilocarpinæ,** for the hair.

Pilocarpine Nitrate 2 grains, Quinine Hydrochloride 8 grains, Glycerin 2 drachms, Rose Water 6 drachms. If *so ordered*, Cantharides Tincture 1 drachm may be usefully combined with above quantities.

Applied locally, and used internally or hypodermically, Pilocarpine seems to have an action in promoting the growth of hair in alopecia or dandruff. Used also in Ⓟ **Ointment,** 4 grains to the ounce of a mixture of wool fat and soft paraffin ointment.

Ⓟ **Granular Effervescent Pilocarpine Nitrate.**

Dose.—1 drachm containing $\frac{1}{10}$ grain for use in throat affections.

Ⓟ **Bromocarpin.** *Syn.* SYRUPUS PILOCARPINÆ ET POTASSII BROMIDI.

Dose.—For children 3 to 7 years of age 1 to 3 drachms daily ; 7 to 15 years 1 to 6 drachms daily ; adults $\frac{1}{2}$ to 1 ounce daily, *all spread over the day.* To be taken before meals.

Stated to have the composition Potassium Bromide 10, Pilocarpine Hydrobromide 0·005, Orange Syrup and Glycerin *q.s.* to 100, *by weight.* In epilepsy and nervous affections.

LAMELLÆ.

Ophthalmic Lamellæ or Discs (*cf.* Index—Lamellæ—for the various medicaments employed) are prepared with Gelatin and a proportion of Glycerin. *Off.*—The discs are 3 m.m. ($\frac{1}{8}$ inch nearly) in diameter. Directions are given.

℞ **Atropine Sulphate** *Off.* weigh $\frac{1}{50}$ grain = $\frac{1}{5000}$ grain in each.

℞ ℙ1 **Cocaine Hydrochloride** *Off.* weigh $\frac{1}{20}$ grain = $\frac{1}{50}$ grain in each. Ⓟ **Homatropine Hydrobromide** *Off.* weigh $\frac{1}{32}$ grain = $\frac{1}{100}$ grain in each. Ⓟ **Physostigmine Sulphate** *Off.* weigh $\frac{1}{50}$ grain = $\frac{1}{1000}$ grain in each.

Medicated Gelatin Lamels.—Thin pliable gelatin sheets of size 9 cm. by 6 cm., divided into 24 squares, each square representing a dose. The sheets are sterilised and will stand variations in climate.

Medicaments.—Acetyl-Salicylic Acid 2½ to 5 grains, Bismuth Subnitrate 2½ grains and upwards. Calomel 1 or 2 grains with or without a dose of aperient, Cascara Extract 2 grains, Chlorodyne 5 minims, Coca Extract ½ grain, Dover's Powder 5 grains, Easton's Syrup 30 minims, Ipecacuanha ¼ to 2 minims, Morphine Hydrochloride 1/6 grain, Phenacetin 3 grains, Podophylin 1/16 grain with 5 minims strong Tincture of Ginger, Quinine Sulphate 2 grains, Strong Tincture of Ginger 5 minims, Tincture of Opium 5 minims, Vegetable Aperient.—L. i./15,283. ***Caution.***—Several of these are poisons in the meaning of the Act and may come under ℞.

LECITHIN, OVO-LECITHIN.

$C_{42}H_{84}NPO_9(?) = 777{\cdot}93.$

Choline Di-Stearo-Glycerophosphate.

Dose.—Internally 3 to 5 grains (**0·2 to 0·3 Gm.**) preferably half an hour before meals, *vide* Emulsion. This dose may well be increased if it is digested, as an average egg contains 16 grains approx.

Subcutaneously ¾ to 2 grains (**0·05 to 0·12 Gm.**) in sterile olive oil every second day.

Manufacture.—It should be prepared from egg yolks by alcohol extraction.

For the Chemistry of Lecithin and its examination, vide Vol. II.

A yellowish wax like mass. It is a constituent of the brain 11%, and of yolk of egg 7%; milk, human, cows', etc., contains varying amounts, *cf.* Vol. II.

An average egg weighing about 50 Gm., of which 30% or 15 Gm. is yolk, is capable of yielding 1·08 Gm. (16 grains) of Lecithin. The dose of Lecithin being 3 to 5 grains thrice daily, *i.e.*, 15 grains as maximum per day, is just short of that contained in a single egg. Lecithin is a drug rather than a food, though its presence in some foods possesses a singular influence on the growing organism.

Lecithin is broken up by the pancreatic juice into Glycerophosphoric Acid, fatty acids and choline,—the last substance if absorbed in quantity might well induce toxic effects, but bacterial enzymes break up Choline into CO_2, Marsh Gas and Ammonia and thus the organism is protected.—L. i./13,1295.

Soluble 1 in 30 of 90% Alcohol, Ether 1 in 5, Chloroform (particularly), Carbon Bisulphide, Benzol and fatty oils. Swells up with water forming a kind of Colloidal Solution.

Flavoring.—Prescribed as Elixir or Emulsion *q.v.*

Uses.—Where the phosphates excreted by the urine are high. Given in neurasthenia, various nervous diseases, diabetes, tuberculosis, tabes and general paralysis; also in all diseases producing a disturbance of nutrition. It is said to cause a marked increase in patient's weight, and to improve the general well-being; augments the blood corpuseles. Rickets and marasmus have been successfully treated with lecithin, and intramuscular injections of Sterile Oil Solution have also given relief. Use suggested in incipient tuberculosis, osteomalacia, pernicious anæmia, and the like.

Has given good results in myasthenia gravis (Gowers).

ixir Lecithin. *Dose.*—2 drachms containing 3 grains of Ovo-Lecithin, thrice daily half an hour before meals.

mulsio Lecithin. *Dose.*—Half ounce, containing 5 grains of Ovo-Lecithin, thrice daily, as the Elixir.

No very hot fluids should be drunk for some time afterwards, so iat the composition of Lecithin may remain unaltered.

In menorrhagia 1½ to 3 grains of Lecithin thrice daily between the eriods has been found useful.

Sterules for Intramuscular Injection. *Dose.*—1 Cc., equivalent) ¾ grain (**0·05 Gm.**) of **Lecithin** (prepared with oil). Also Ⓟ with trychnine $\frac{1}{120}$, and Ⓟ1 $\frac{1}{30}$ grain with **Guaiacol** ¾ grain.

Capsules, Pills and **Tablets** contain 1½ grains (0·1 Gm.). **Tabellæ** chocolate basis contain ½ grain.

Is contained in **Pilula Potentin Composita**, *q.v.*

Ⓟ ✱ **"Byno"** (T.M. 215670)–**Lecithin.** *Dose.*—One tablespoonful three times a day half an hour before meals. A proprietary ontaining Lecithin, Liquid Malt Extract with Cinchona and Nux Vomica alkaloids. Digestive nerve tonic and food. Each ounce ontains 4 grains of Lecithin.

Lecitogen. *Dose.*—3 to 4 drachms. A Cocoa preparation containing 1% Lecithin 22% nitrogenous material, 25% fat, 8% starch.

Effervescent Lecithin 3 grains in 1 drachm (a dose) is prepared. This reparation froths up considerably when added to water for consumption—this respect it is a little inelegant pharmaceutically. The frothing is unvoidable.

ilula Lecithin cum Ferri Iodido.—*Martindale.*

Contains 2 grains of Lecithin with 3 grains of Ferrous Iodide. In næmia to increase metabolism and as a tonic in convalescence.

owdered Lecithin. *Dose.*—10 to 15 grains (**0·6 to 1·0 Gm.**) thrice daily before food as powder or cachet.

A light yellowish powder containing 33% Lecithin flavoured with accharin and Peppermint Oil. When given prescribed as powders he dose may be mixed with ½ wineglass of water.

Copper-Lecithin.—A combination of Lecithin and Copper Chloride, ontaining 4·5% of Copper, has been used with good results in hthisis, epithelioma and primary lupus. It has been administered s ointment, injections, in capsules and pills. Doses employed for ubcutaneous injection were 0·5 to 1 Cc. of 1 to 2% solution of Copper-Lecithin twice weekly.—B.M.J. ii./13,358; M. 1913.

Lipoids. Walker's "Organic Chemistry" suggest there are various forms f these fat-like substances. (1) Cholesterol (2) Cerebrosides. These contain Nitrogen but not Phosphorus, and on hydrolysis yield among other things Galactose. (3) Phosphatides or Phospho-lipines.—*e.g.* Lecithin. See also apones and Vol. II.

LIGATURES.

Catgut Ligatures are obtainable commercially 'Raw' and Sulpho-Chromic in hanks in sizes Nos. 000,000 (the thinnest) up to No. 8.

Preparation of Chromic or Sulpho-chromic Catgut Ligatures.

LORD LISTER'S DIRECTIONS.—Soak the catgut 24 hours in twenty times its weight of 'preparing liquid'—made as follows:—Dissolve Chromic Acid 4 in water 240 (weight), add Sulphurous Acid Solution (*Off.*) *q.s.* to produce *green* colour of Chromium Sulphate $Cr_2(SO_4)_3 = 392{\cdot}18$. Then add water to make 480 (weight), next add solution of Mercuric Chloride 2 in water 320 (weight). Dry the catgut on the stretch. The antiseptic Chromium Sulphate Solution, Lord Lister found the nearest approach to the ideal to produce a ligature capable of fulfilling the necessary conditions as to strength elasticity and asepsis.

Ligatures are also supplied in carbolic acid solution 1 in 20, carbolised alcohol, turpentine, and various other antiseptics.

Immersion in **Clove Oil** 8 days then in Alcohol 6—8 hours has been advocated for sterilising. A further method is to heat the catgut gradually in **Cumene** to 70° C., then in the same substance to 170° C. for two hours. Finally to rinse in petroleum benzine.

By **Cumene** or **Cumol** is intended a hydrocarbon (a) Trimethyl-benzene $C_6H_3(CH_3)_3[1:3:4] = 120{\cdot}141$ obtained by fractionation of Coal Tar it boils between 160° and 170° C.—when pure at 169·8° or (b) Isopropyl-benzene $C_6H_5CH(CH_3)_2$. The latter boils at 152° C.,—the former body is therefore, more suitable for sterilising catheters. The names Cumol and Cumene, or better *Cymene*, as distinct from Cumene above are, however also given to *p*-Methyl-iso-propyl-Benzene $C_6H_4\begin{cases}CH_3\\C_3H_7\end{cases} = 134{\cdot}162$. This is obtained from Cumin Oil, and can be made from Camphor. It boils at 175° to 176° C., has Sp. Gr. 0·8678 @ 12° C., and possesses a pleasant odour.

Hardening Treatment.—By soaking 1 hour (a) in 1 in 1000 Potassium Bichromate. These are two to three weeks—soluble or (b) more durable, *i.e.*, to last 5—6 weeks use 1% solution for same period. The gut is supplied in Xylol in sealed tubes.

Iodised Gut (Claudius' Method).—Raw gut, which has been previously soaked in Ether to remove fat, is sterilised by soaking in a solution of Iodine 1, Potassium Iodide 1½, Distilled Water 100 for ten days. (Some use weak Tincture of Iodine diluted 15 times with 50 % Alcohol.) About 4 ounces of Solution is sufficient for half a dozen hanks. The Gut is then of a brown colour, in a sterile pliable condition and ready for use—remove and place in 3% Phenol or Normal Saline prior to operation.

Iodine-Formalin Catgut.

Catgut prepared with Iodine and Alcohol is washed with a weak Carbolic Solution; it is then treated according to its thickness in a 3% Formalin Solution for twenty-four hours, and washed in water. Store in a solution of Alcohol 50% containing 5% Glycerin and 0·5% Iodine.

Vide also **Iodo-Acetone.**

FR CX. sterilises Catgut in absolute alcohol at 120° C. for 45 minutes in sealed tubes of hard glass.

Catgut sterilised with advantage by ether, chloroform, absolute alcohol or petrol in preference to "chemicals"—any one of them will render gut sterile in 24 hours.—G. S. Thompson, B.M.J. i./17,873.

Absorbable Iodine Catgut.—Catgut, defatted by ether, is boiled in absolute Alcohol for an hour, then placed in a solution of 1 part Strong Solution of Iodine and 11 parts of Water for a week. It is preserved and used from a solution of 1 part Strong Solution of Iodine and 50 parts Rectified Alcohol.—B.M.J. i./10,320.

Kangaroo Tendon, St. G.H. is washed with Ether Soap, treated with antiseptics and preserved in Alcohol.

Horsehair, St. G. H., is boiled in water 10 minutes only.

Palmyra Fibre or Malabar Fibre obtained from the fibrous netting surrounding base of the leaves of the Toddy Palmyras as suturing material satisfactory.—B.M.J. ii./17,780.

Roeder's Method. Picric Acid, saturated solution in Clove Oil. Leave the gut one week in this. Rinse 10 seconds in water and store in 95% Alcohol. In 4 days it is ready for use. It is an advantage to formalise in 5% solution for 24 hours first.—J. D. S. Sinclair, L. i./16,212.

Silk Sutures are supplied on reels and in hanks, sizes 0, 1, 2, also sterilised in Absolute Alcohol and Phenol Solution. Sterilised by immersing in Olive

Oil for 12 hours and then boiling in the same and keeping in Carbolised Spirit. In infantile paralysis silk ligaments cause formation of a tough tissue or tendon.

Silkworm Gut, extra fine, fine, medium and stout—is made in 10 and 14 inch lengths.

LITHIUM.

Li=6·94.

Lithium Salts have long had a reputation for assisting in the elimination of Uric Acid, but their effect is probably analogous with corresponding Potash Salts. They should be given freely diluted.

Lithium Poisoning by large doses of Chloride taken experimentally, *e.g.*, 2 Gm. three times a day before meals. In all 4 doses, *i.e.*, 8 Gm., were taken. After the 4th dose taken next night, there was marked dizziness and sleep was impossible. Weakness and tremors were intense the next day. Ocular and aural symptoms lasted 36 hours. There were no gastric intestinal symptoms and appetite remained good.—L. i./13.1815.

Lithii Benzoas, $C_6H_5COO\ Li = 128·015$.

Dose.—2 to 10 grains (**0·12 to 0·6 Gm.**) or more.

Usually a light white crystalline powder, Antilithic, ***Soluble*** about 1 in 4 of water, about 1 in 12 Alcohol 90%. ***Incompatible*** with Acids and Sodium Bicarbonate.

Lithii Bromidum, Li Br. = 86·86.

Dose.—5 to 15 grains (**0·3 to 1 Gm.**).

White, deliquescent, slightly bitter granules, neutral reaction; very soluble in water and alcohol.

Contains 91% Bromine as against 67% in Potassium Bromide, hence effect is greater, especially as a hypnotic, and in epilepsy.

Lithii Carbonas. $Li_2CO_3 = 73·885$.

Dose.—2 to 5 grains (**0·12 to 0·3 Gm.**). **Tablets,** 5 grains. Soluble in water about 1 in 70. Diuretic, thought to increase the alkalinity of the blood.

Lithii Citras. $C_3H_4OH(COOLi)_3.4H_2O=281·954$.

Dose.—5 to 10 grains (**0·3 to 0·6 Gm.**). **Tablets,** 5 grains.

White crystalline powder. Diuretic. ***Soluble*** 1 in 2 of water.

Effervescent Lithium Citrate.

Dose.—1 or 2 drachms (**4 to 8 Gm.**). Contains 1 in 20.

***'Vescettes'** (T.M. 260597) of **Lithia,** contain 3 and 5 grains Lithium Citrate.

Lithii Citras Laxativus Effervescens, B.P.C.—30% Sodium Phosphate, 10% Lithium Citrate.

Dose.—60 to 120 grains. A diuretic purgative and antilithic.

Lithii Guaiacas, Lithium Guaiacate.

Dose.—5 grains (**0·3 Gm.**) in pill twice a day.

Prepared by digesting guaiacum resin in solution of lithium oxide, decanting the solution, evaporating, and scaling it. Contains Lithium Oxide 1, Guaiacum Resin 3. Given for chronic gout and rheumatism.

Lithii Hippuras. $CH_2NH.C_7H_5OCOO.Li = 185·057$.

Dose.—5 to 20 grains (**0·3 to 1·2 Gm.**).

In light white minute crystals, soluble in water 1 in 2½, is a powerful

solvent of lithates; useful in gout and rheumatism, *cf.* Piperazin. **Vescettes** contain 5 grains. **Effervescent Lithium Hippurate** 5 grains in 1 drachm.

When prepared by neutralising Lithium Carbonate suspended in hot water with hot aqueous solution of Hippuric Acid, Phenolphthalein as indicator; the solution concentrated and the product, twice recrystallised and dried on a porous plate, was found to contain two molecules of water.—C. E. Corfield, B.P. Conf., 1923.

T. Bodley Scott warns against using 20 grain doses of lithium hippurate. It is a safe and sure depressor of arterial tension; 3 or 4 grains of the lithium salt or 6 to 7 grains of the ammonium salt suffice.—Pr. Aug. '12,257, *et seq.*

Lithii Iodidum, Li I = 133·86.

Dose.—1 to 5 grains (**0·06 to 0·3 Gm.**).

White crystalline deliquescent powder. A salt rich in iodine,—containing 94·7%. An antiarthritic and has been employed in syphilis, also in rheumatoid arthritis by iontophoresis, *q.v.*

Lithii Salicylas. $C_6H_4OH.COO$ Li=144·015.

Dose.—5 to 20 grains (**0·3 to 1·2 Gm.**) for rheumatism and gout. A deliquescent white powder ***soluble*** 1 in 1 of water, forming a neutral or slightly acid solution. ***Incompatible*** with acids and with Sodium Bicarbonate.

Effervescent Lithium Salicylate contains 1 in 30.

Dose.—1 or 2 drachms.

Lithii Sulphas $Li_2SO_4H_2O$=109·94.

Dose.—5 to 10 grains (**0·1 to 0·6 Gm.**).

White crystals soluble in Water and Alcohol. Ionic Solubes are prepared for Iontophoresis, *q.v.*

Lithii Tartras Acidus.

CHOH. COOLi. CHOH. COOH, $1\frac{1}{2}$ H_2O = 183·034.

Dose.—5 to 20 grains (**0·3 to 1·2 Gm.**).

White crystalline powder, used in gouty cases with gum affections.

Lithion is a granulated (non-effervescent) preparation composed of lithium citrate, magnesium sulphate, sodium sulphate, &c. *Dose.*—One-half to one teaspoonful taken in a little warm water.

✱**Thialion** (T.M. 221418) is a laxative Lithia Compound.

Sodium Sulphate (anhydrous) 26%, Sodium Citrate 56%, Sodium Chloride 3%, Potassium Citrate 3%, Lithium Citrate 3%, Water 9%.—B.M.J. ii./08,779.

MAGNESIUM.

Mg = 24·32.

Magnesii Carbonas Levis (*Off.*). $3(MgCO_3)$, $Mg(HO)_2,4H_2O$ = 383·375. (This formula is no longer given in B.P.). Is prepared by precipitation of Magnesium Sulphate Solution with Sodium Carbonate. **Magnesii Carbonas Ponderosus,** similarly in more concentrated solution and by boiling and evaporation to dryness, and washing with water to remove Sulphate. *Dose.*—30 to 60 grains, or 5 to 20 grains repeated.

A useful substance for clarifying liquids from suspended matter.—P.J. ii./21,500.

Liquor Magnesii Bicarbonatis (Carbonatis) (*Off.*). FLUID MAGNESIA. *Dose.*—1 to 2 ounces (**30 to 60 Cc.**)

A colourless liquid, containing 10 grains of Magnesium Carbonate in 1 ounce of Carbonic Acid water.

Magnesia Levis and Magnesia Ponderosa, (*Off.*). MgO = 40·32. These are prepared from the respective carbonates by exposure to a dull red heat. *Doses* as for carbonates. Antacid, antilithic, diuretic, laxative.

✱**Bisurated** (T.M. 340411) **Magnesia.**—*Dose.*—Half teaspoonful in water after meals. A proprietary article termed 'an Antacid,' in form of a white powder.

Mannich and Leemhuis find it to contain approximately Bismuth Carbonate 8, Sodium Bicarbonate 40, Magnesium Carbonate (probably heavy) 52. —P.J. ii./13,257,563.

Liquor Magnesii Citratis U.S. *Limonade Purgative au Citrate de Magnèsie.* Fr. Cx.

Average daily dose.—12 ounces

Magnesium Carbonate 15, Citric Acid 33, Syrup of Citric Acid 60, Potassium Bicarbonate 2·5, Water *q.s.* to nearly 360.

Limonada Rogé in S. America is similar to Fr. Cx.—Ph. Notes.

Magnesii Chloridum, $MgCl_2$, $6H_2O$ = 203·336. *Dose.*—30 to 60 grains (2 to 4 Gm.) increased.

Deliquescent crystals, very soluble in water. Mild purgative, a dose in ½ pint of hot water useful for constipation and in dyspepsia and stomach disorders.

War wounds have been treated with 1·2% Solution.

Magnesii Chloras. $Mg(ClO_3)_2$, $6H_2O$ = 299·336.

Deliquescent white crystals made by decomposing the barium salt with Magnesium Sulphate.

Has been used in form of ointment (20%) on epithelioma of the lip.

Magnesii Hydroxidum, $Mg(OH_2)$=58·336. Magnèsie Hydratée. Fr. Cx.

Dose.—5 grains to 2 drachms (0·3 to 8 Gm.).

Prepared by decomposition of Magnesium Sulphate 24½ with Sodium Hydroxide 8 in solution, the precipitate washed free from sulphate and dried at low heat.

According to the Fr. Cx., calcined magnesia is boiled with 20 to 30 times its weight of distilled water 20 minutes. Dry as much as possible by collecting on calico and finally at 50° C. until it no longer loses weight. Thus prepared, Magnesium Hydroxide contains 31% H_2O.

It dissolves more freely in dilute acids than calcined magnesia. It is a recognised antidote in arsenical poisoning.

✱**Alkagen Tablets** (T.M. 347033). *Dose.*—1 to 3 with water. Contain Magnesium Hydroxide and Peppermint Oil. For "acidity," flatulence, etc. It is not open to the objection that Carbonic Acid is liberated as in the case of Carbonates and Bicarbonates.

Pulvis Magnesii Hydroxidi cum Carbone.

Dose.—1 to 2 drachms in a little water after meals.

Magnesium Hydroxide 1, Wood Charcoal 2.

Is suggested in dyspepsia. The Magnesium Hydroxide is antacid and the charcoal has the property of gas absorption. Furthermore, the charcoal would tend to preserve the hydroxide.

A little cinnamon powder (1 in 8) is occasionally added.

Cremor Magnesiæ. Magnesia Cream.

Dose.—1 to 4 drachms in a little water.

A palatable concentrated preparation. Each ounce represents 24

grains of suspended Magnesium Hydroxide. Antacid without evolving Carbon Dioxide—hence no distension is caused.

Uses.—In indigestion, dyspepsia, acidity, rheumatism, and as an alkaline mouth wash, forming a film of Magnesium Hydrate over the tooth surface. A useful antidote in case of poisoning by mineral acids.

Magnesii Lactas.—$(C_2H_4\ OH.\ COO)_2Mg.\ 3H_2O = 256{\cdot}478$.

Dose.—15 to 60 grains (**1 to 4 Gm.**). White crystalline powder. ***Soluble*** 1 in 30 of water.

Useful in some cases as a hæmostatic where Calcium Salts do not seem to act. A dose of 30 grains usually reduces time of coagulation of the blood 30%, *e.g.*, from 2 to 1¼ minutes. The salt can be made extemporaneously by the dispenser, if prescribed in a mixture, from Magnesia, with Lactic Acid *q.s.* The large dose of the bulky powder, if ordered in that form, is inconvenient to take. Note.—Magnesium Oxide 1 requires Lactic Acid (75%) about 5 to dissolve it.

Oozing of blood from the gums has been well treated by 40 to 60 grain doses. For erosion of bone, due to scurvy, this and the Calcium Salt are valuable.—Sir A. E. Wright.

***Neolyse** (T.M. 415231). A preparation of Silico-Magnesium salts. It has been advocated for the palliative treatment of malignant disease. According to various authorities who have worked on the subject, more particularly in France, Magnesium salts tend to destroy superficial cancerous growths, and they give encouraging results in inoperable cancers. An interesting point is that cancer is unknown or rare in regions where the drinking water has a marked content of Magnesia salts. It is thought that Magnesia and Silica play the same part in cancer that Lime does in tuberculosis. The works of Delbet and of Robin on Silico-Magnesian compounds have laid stress on the utility of these bodies. It is obvious that a fairly lengthy treatment would be required to carry out the theory and it is necessary to commence at the first suspicious signs. The idea of using the Silica compound is to employ an insoluble salt which would only be slowly eliminated, and in order that the organism may utilise the essential constituent gradually.

Cachets of Neolyse. *Dose.*—1 cachet thrice daily before meals for 20 days, then interrupt treatment for 10 days, and continue until the desired result is obtained.

Neolyse injections, plain and radio-activated. *Dose.*—The injections are given daily, or at intervals of two or three days, either subcutaneously or intramuscularly. They are not painful and do not cause local inflammation.

Neolyse Compresses, for local application. One or two compresses are directed to be placed over the part and to be covered with gauze. See also B.M.J. ii./18,118 and M. A. Robin, Bull. Acad. Med., Jan. 31, 1922.

Magnesii Sulphas. Fr. Sel Anglais or Sel d'Angleterre.

$MgSO_4.7H_2O = 246{\cdot}492$.

Dose.—2 to 4 drachms or 30 to 90 grains repeated (*Off.*).

Soluble 10 in 13 of water—measuring 18·5. ***Incompatible*** with Soda Tartarata and Alkaline Carbonates.

Flavoring.—Glyl Menthæ Piperitæ, Glyl Cinnamomi; Syrupus Zingiberis.

Solutions kept ready for dispensing should be well sterilised; this ill effectually prevent the fungoid growth which occasionally occurs.

Uses.—Largely employed as an efficient evacuant.

Dysentery in South Africa was treated by the "Evacuant Method" -Magnesium and Sodium Sulphates, Castor Oil, Calomel, also with pecacuanha Powder.

Intraspinal Anæsthesia has been induced by injecting Magnesium ulphate in dilute solution.

TETANUS has been treated by spinal, intracerebral and subcutaneous injec-on—the usual dose being 1 to 5 Cc. of 25% solution. In Germany during ie war fairly large doses were given. 1 Cc. of the 25% Solution for very 25 lbs. body weight every 24 hours—not more than 45 to 60 grains at ie time. If found toxic employ artificial respiration and give cardiac stimu-nts. Calcium Chloride is an antidote to Magnesium Sulphate—an injection 5 Cc. of 5% solution counteracts the effects almost instantaneously.—Pres. he method was not found of service by our W.O. authorities. Intraspinally is an anticonvulsant, but it is best to use dilute solution in large amounts — pint to a quart of 1 to 2% solution at intervals by hypodermoclysis.—H. reeley, L. i./15,99.

Further abstracts and references, *vide* previous editions.

CHOREA treated by 1 to 5 Cc. of 25% Solution of the *pure* salt. Weaker olution, *e.g.*, 7·3%, which is isotonic with the cerebro-spinal fluid was, how-ver, advised—of this 3·4 Cc. = 1 Cc. of the 25%. See also M.P.C., Oct. ii./22 03. In EPILEPSY 1 Cc. of 1 in 5 Solution or 1 Cc. of 1 in 2 Magnesium Chloride ypodermically beneficial.—B.M.J. i./08,12.

ECLAMPSIA, Suppression of the convulsions in.—Intrathecal injections of 5% Magnesium Sulphate Solution, allowing 1 Cc. for every 25lbs. (approx.). -L. ii./12,1575.

Poisoning by Magnesium Sulphate.—

Seven cases in all are reported since 1841. In the particular case reported ere subcutaneous injections of Saline into tissues of axilla gave relief, also alomel ½ grain every hour until bowels opened and recovery.—L.i./09,1174.

In acute articular RHEUMATISM and in gonorrhœal epididymitis, orchitis, onorrhœal rheumatism, neuritis, also in erysipelas and cellulitis, and in eneral for the relief of pain associated with local inflammation, local applica-ion of a hot saturated solution in 10 to 15 layers of gauze or a thin layer of bsorbent Cotton or Lint applied around the limb or on the face has given xtraordinary results. Action is empirical—not due to osmosis.—L. i./ii,300.

In RHEUMATISM injected into the buttock and infra-scapular region. *Dose* —4 Cc. of 25% Solution daily for the first three or four days and then alternate lays.—P.J. i./12,124. 3 grain doses hypodermically purge and relieve.— . ii./11,481.

SCALDS AND BURNS well treated by a concentrated (25% and over) solution. . J. Meltzer, Jl. Pharm. & Exp. Therap., Nov., 1918.

HYPOPYON ULCERS treated with Magnesium Sulphate Lotion—up to satu-ated solution. Encouraging.—D. Matheson Mackay, B.M.J. ii./21,738. See lso M. Kirkpatrick, per T. D. B., Aug. 15, 1921, p. 83.

As a SEDATIVE IN MENTAL CASES. 2 Cc. of 50% solution injected. In 82·7% of cases the action was prompt, the patient becoming quiet in 13 to 30 minutes and then sleeping from 5 to 7 hours.—M.P.C. i./23,291.

RODENT ULCER of the face healed after 5 injections of Magnesium Sulphate. —R. W. Moir, per Pres., June, '23,237.

A solution of 35 grains to the ounce useful as lotion in lymphangitis, ery-ipelas, cellulitis, orchitis, epididymitis and all vague œdemas and swellings.— 3.M.J. i./16,400.

Magnesium Sulphate Cream.

Mix together exsiccated Magnesium Sulphate 1½ lbs. with 11 ounces of lycerole of Carbolic Acid (1 in 10) in a hot mortar to make a cream. (The arbolic acid may, however, be omitted.) Pack and thickly cover the wound ith the cream. The dressing of gauze and wool is left unchanged for 3 to 8 lays. Profuse discharge of serum takes place, so that more wool may be anted. After a few dressings like this Magnesium Sulphate *solution* is used.

Good osmotic action and inhibitory effect on the aerobic and anaerobic organisms.—A. E. Morison, B.M.J. i./18,342.

As a **Granular Effervescent** preparation, *Dose.*—½ to 1 ounce (**15 to 30 Gm.**), or 1 to 3 drachms (**4 to 12 Gm.**) repeated, Magnesium Sulphate is frequently more effective, and more palatable.

'Vescettes' of Magnesium Sulphate, each containing 30 grains.

To be crushed and dissolved in a small draught of warm water.

Mistura Alba. *Dose.*—½ to 2 ounces.

Magnesium Sulphate 30 grains, Magnesium Carbonate 15 grains, and Peppermint Water 1 ounce. A mild aperient.

Magnesii Sulphas Exsiccatus.—If crystallised Magnesium Sulphate be heated at 100° C. it will lose 37—40% moisture. It is a fine white powder without odour with a saline bitter taste, giving a warm sensation to the tongue due to its recombining with water. Almost completely soluble in water Aqueous solution (1 in 40) should be neutral to litmus paper.

Enema Magnesii Sulphatis. ½ to 2 ounces in ½ to 1 pint of water.

Magnesii Sulphis, *v.* p. 105.

Grignard Reaction, Mechanism of.—J.C.S.A. i./20,30.

MALTUM.

Maltum. Grain of barley partially germinated artificially and then dried. Yields 70% extract. The acidity calculated as lactic acid should not exceed 0·3%. It should not contain more than 1/100 grain Arsenic calculated as Arsenious Oxide to the pound.

Malti Pulvis. *Dose.*—1 to 2 drachms (**4 to 8 Gm.**).

Malt flour or entire malt powdered, is added to baked wheaten flour in various proportions to form the popular infants' foods, and is given to assist digestion. When these are mixed with hot water or a mixture of hot milk and water, the starch contained in the wheaten flour becomes soluble and digested into dextrin and malt sugar. The diastasic property of malt is most acute in aqueous solution at 104° F.,—a boiling heat destroys it. A small teaspoonful of malt flour may be sprinkled over or mixed with cooked farinaceous foods, coffee, beer, &c.

Diastase. Obtained by exhausting malt with tepid water, precipitating with alcohol, and drying at below 45° C. Is a yellowish white powder or in translucent scales. According to Fr. Cx. diastase converts 100 times its weight of starch into sugar and dextrin. Its use is indicated by the presence of starch grains in the fæces or urine.

Extractum Malti.—*Syn.* Extractum Bynes, Extrait d'Orges.

Dose.—1 to 4 drachms.

A brownish semi-liquid substance Sp. Gr. about 1·400, with pleasant sweet taste, consisting principally of maltose (about 50%), with dextrin, dextrose, diastase, proteid, phosphates and aromatic principles. It is made by mixing malt with tepid water (55° C., *i.e.*, 131°F.), pressing, filtering, and evaporating *in vacuo* at below 55° C. Extract of Malt and its preparations are prescribed in cases of debility of all kinds, as a restorative, like cod liver oil, but particularly where digestion is weak. It should digest twice its weight of arrowroot starch in 30 minutes at 40° C. (B.P.C., 1901). *Further on assay and adulterants, Vol. II.*

Incompatibility. A few years ago we determined the compatibility or incompatibility of numerous Soluble Chemicals with Malt Diastase. Broadly speaking, the following are incompatible: **Acids**, various Inorganic and Organic, also **Acid Preparations, Ferric Chloride, Pepsin Preparations, Potassium Permanganate.** In *Vol. II.* we provide further details. *cf. also* '**Enzyme Action.**' A mixture of Hydrogen Peroxide and Ferrous Sulphate can liquefy starch similarly to an enzyme.—C.D. ii./13,851.

***Maltaffin.** (T.M. 355917)—*Martindale.*

Dose.—One to two teaspoonsful at bedtime. Children, half to one teaspoonful, increased if necessary.

A combination of Liquid Hydrocarbon Oil with Malt Extract as an electuary. Suitable for children. The oily taste is largely masked.

Maltaffin is also made with **Hypophosphites**, with **Cascara**, with **Iron**, with **Glycerophosphates**, and with **Quinine** and **Strychnine.**

***Maltine** (T.M. 15025 & 40301) is obtainable plain; with cod liver oil 30%; with iron pyrophosphate 8 grains to the ounce; with pepsin and pancreatin; with hypophosphites of lime 3 grains, of soda 3 grains, of iron 2 grains in the ounce; with phosphate of lime 4 grains, of soda 4 grains, and of iron 3 grains in the ounce (Malted chemical food); with Ⓟ iron pyrophosphate 4 grains, quinine 1 grain and strychnine $\frac{2}{75}$ grain in each ounce; with cascara = 66 minims of liquid extract; and with creosote 4 minims to the ounce.

Cream of Malt is a special preparation. It is supplied 'plain,' with Cascara, with Cod Liver Oil, with Cod Liver Oil and Hypophosphites, with Creosote, Dialysed Iron, Ⓟ Easton's Syrup, &c.

Diamalt is stated to have diastasic power 1060—(1392 elsewhere)—higher than many of the Malt Extracts on the market. Contains 5·8% proteins. Digested seven times its weight of starch at body temperature.—L. i./09,551

Diamalt with Cod Liver Oil contains 16·6% 'Oil,' and the Extract present has diastatic power—592. Commercial brands compared.—B.M.J. i./10,30.

***Diaparaffin.** (T.M. 354317). *Dose.*—1 or 2 (children $\frac{1}{2}$ to 1) tablespoonsful. A palatable combination of Diamalt and Paraffin. An efficient laxative in dry powder form. It contains 28·2% Liquid Paraffin.—L. i./14,41.

PATENTS: See 13,928/1913 and 26,390/1913; also 29,481/1912

Extractum Malti Liquidum.

Dose.—1 to 4 drachms (**4 to 15 Cc.**).

In place of evaporating malt infusion to the viscosity of the solid extract, if it be concentrated *in vacuo* to prevent decomposition of the ferment diastase until it has Sp. Gr. 1·375, and about 7% of alcohol added, making the finished product of Sp. Gr. 1·250, a liquid extract is formed which is more convenient.

Glycerin is added; Alcohol only precipitates the diastase, also a small quantity of Formaldehyde as preservative.—P.J. ii./07,732.

***Bynin** (T.M. 41136). A commercial brand of Liquid Malt Ext.

Ⓟ ***Bynin Amara.** *Dose.*—2 to 4 drachms well diluted.

Contains Quinine Phosphate $1\frac{1}{2}$ grains, Iron Phosphate 2 grains, Strychnine Phosphate $\frac{1}{16}$ grain, in liquid malt extract (Bynin) 1 ounce. It is $\frac{1}{4}$ the strength of Easton's Syrup.

Extractum Malti cum Hypophosphitibus.

Dose.—1 to 4 drachms (**4 to 15 Cc.**). Dissolve Calcium Hypophosphite 0·5 in water 4, and Sodium Hypophosphite 0·5 in water 1, then add Liquid Extract of Malt *q.s.* to 100.

Extractum Malti cum Hypophosphitibus cum Oleo Morrhuæ.

Dose.—1 to 4 drachms (**4 to 15 Cc.**). Contains Calcium Hypophosphite and Sodium Hypophosphite of each 0·5, Cod Liver Oil 15

and Liquid Malt Extract *q.s.* to 100. Label this 'Shake the bottle.'

Extractum Malti cum Cascara.

Dose.—1 to 4 drachms (**4 to 15 Cc.**). Liquid Extract of Cascara 1, Liquid Extract of Malt 7. This is palatable. Mix and mark 'Shake.'

Extractum Malti Ferratum, G. H., E.

Iron Pyrophosphate 2, Water 3. Dissolve and add Extract of Malt 95. *Dose.*—1 to 4 drachms (**4 to 15 Gm.**).

Extractum Malti cum Hæmoglobin.

Dose.—1 to 4 drachms (**4 to 15 Cc.**).—Hæmoglobin 1, Liquid Extract of Malt 7. Mix and mark 'Shake.'

Extractum Malti cum Syrupo Ferri Phosphatis. *Syn.* MALTOFERROSE. *Dose.*—1 to 4 drachms (**4 to 15 Cc.**).

Each drachm contains: Phosphates of Iron $\frac{1}{4}$ grain, and of Calcium $\frac{1}{2}$ grain, with $\frac{1}{4}$ grain each of Sodium and Potassium Phosphates.

Extractum Malti cum Oleo Morrhuæ. *Dose.*—1 to 4 drachms. This preparation should contain at least 15% Cod Liver Oil.

Extractum Malti cum Pancreatina. *Dose.*—1 to 4 drachms (**4 to 15 Cc.**). Liquid Extract of Malt 2, Pancreatic Solution 1.

We find this produces a perfectly clear solution without any deposit: on the other hand, made with Pancreatin 2, Glycerin 10, and Liquid Extract of Malt to 100, the result was not satisfactory. Assists digestion of farinaceous food.

✱**Bronamalt** (T.M. 340637) (previously known as Vibrona Malt).

Dose.—1 to 2 drachms with or immediately after meals.

Described as a tonic food. A combination of a hydrobromic Extract of Cinchona with a liquid Malt. In cases of impaired nutrition and loss of appetite, especially in children.

✱**Lacto Maltine** (M.M. 156408 Class 42).

Dose.—One dessert-spoonful after meals in tea, coffee, milk, wine or farinaceous food.

A preparation rich in milk-fat, easily digested. The diastasic ferment acts as an adjunct where there is feeble carbohydrate digestion.

Extractum Malti Siccum.

Contains about 75% Maltose, 1·5% Phosphates, 5% Albuminoids *Dose.*—1 to 2 drachms.

A somewhat hygroscopic yellowish coarse powder, easily soluble in water. Is desiccated carefully *in vacuo* and hence keeps well.

In some experiments, we found British Dried Malt Extract to be more active than foreign, but not quite so active as Extractum Malti.

Dry Malt Extract with 50% Paraffin.

Dose.—Infants, one teaspoonful dissolved in slightly warmed milk feed three times a day. Children, two teaspoonfuls two or three times a day. Adults, one tablespoonful three or four times daily. Best taken just before or after meals.

This has the appearance of a crystalline compound. It emulsifies with water.—L. i./15,918.

Taka Diastase. *Dose.*—1 to 5 grains (**0·06 to 0·3 Gm.**).

A whitish powder obtained by the cultivation of a fungus, *Eurotium Oryzæ*, on bran; possesses amylolytic properties.

Useful for gouty dyspepsia and hyperacidity of the stomach.

Taka Diastase in 5 grain Capsules after each meal and at bed-time improves diabetes mellitus,—amount of urine and sugar content lessened.—L. i./11,826.

Mead's Dextri-Maltose. A powder containing 51% Maltose, 42% Dextrin and 5% Water and at choice, salt free, or containing 2% Sodium

Chloride or Potassium Bicarbonate 3%. No. 1 (with salt) is for infant feeding, No. 3 (with Potassium Bicarbonate) for infants who suffer from constipation. No. 2 (salt free) for use by practitioners who prefer to make their own salt additions.—L. ii./22,520.

MANGANESIUM. (*See also* p. 382).

Mn = 54·93.

Manganesii Butyras. $Mn[C_3H_7COO]_2 = 229·082$.

Preparation.—Manganese Butyrate is precipitated as a heavy oily liquid by interaction of solutions of Sodium Butyrate and Manganese Chloride. This oil is washed with water, dried over Sulphuric Acid, and then washed with Ether to remove free butyric acid. The product is again dried over Sulphuric Acid for some days, and powdered.

Characters.—Pale pink powder having only a slight odour of Butyric Acid. Dissolves in about 6 parts of cold water. The substance is hydrolised by boiling water with deposition of Manganese Hydroxide.—According to our experiments, 1923.

Uses.—Boils, carbuncles, erysipelas, whitlows, lymphangitis, lymphadenitis, gonococcal urethritis and abscess formation said to be well treated by Manganese Butyrate Solution (1%). *Dose*: 1 to 1·5 Cc. intramuscularly—not more than 3 injections should be given with 3 or 4 days' clear interval between them.—J. E. R. McDonagh, B.M.J. i./23,810.

Should be used prior to making incisions in septic lesions. Two injections should cause the lesion to abort if no pus has formed and if pus has formed, the part will come to a head ; then use a dry dressing.—M.P.C., Dec. 20/22.

VASCULAR HYPERTENSION AND HYPOTENSION.—Hypertension and hypotension are stated to be caused by changes in the nature of the protein particles of the plasma.

Hypertension is a result of the protein particles leaving the colloidal state and forming true solutions, and is found in cases of chemical intoxication, in some cases of syphilis and diabetes, in pregnancy and at the menopause, and is the natural sequence of old age. The best remedy for acute cases is the injection of 1% Manganese Butyrate solution in doses of 1·0, 1·5, 2·0 Cc. at five day intervals. In chronic cases, Insulin 20 units is a suitable drug. With all these methods the course may have to be repeated.—J. E. R. McDonagh, M.P.C., Jan. 23 & 30/1924.

For a further abst. of this paper *re* hypotension see Adrenalin and Testicular Extract.

Manganese Butyrate Sterules. 1, 1·5 and 2 Cc. are made.

Trimine. *Dose.*—8 to 15 minims (**0·5 to 1 Cc.**). A Colloidal Manganese containing Colloidal Iron and a trace of Colloidal Zinc in addition. Advised in conjunction with Colloidal Palladium in treatment of gonorrhœa and complications.—J. E. R. McDonagh, Pr. January 1920.

Manganesii Citras, 'Soluble.' *Dose.*—3 to 5 grains (**0·2 to 0·3 Gm.**).

This, a double salt with Sodium Citrate, and **Ferro-Manganese Phosphate**—*Dose.*— 3 to 10 grains (**0·2 to 0·6 Gm.**)—are scale preparations.

Manganesii Hypophosphis, $MnP_2H_4O_4+H_2O=203·058$. *Dose.*—1 to 10 grains (**0·06 to 0·6** Gm.).

A white or slightly rose-tinted powder, soluble 1 in 10 of water. A nerve stimulant.

Manganesii Oxidum Præcipitatum.

Dose.—3 to 10 grains (**0·2 to 0·6 Gm.**), or more, in pills with syrup. Tablets, 2 grains (**0·12 Gm.**).

Manufactured from Manganese Sulphate by action of Ammonia and Hydrogen Peroxide.

Consists principally of manganese di-oxide $MnO_2 = 86{\cdot}83$ (U.S. contains not less than 80% MnO_2), a bulky blackish brown powder, free from grittiness and entirely soluble in cold hydrochloric acid.

Uses.—In gastrodynia, pyrosis, and in amenorrhœa taken 3 or 4 times a day before expected period. In chlorosis it assists the action of iron salts, and is less irritant than the permanganates.

Manganesii Phosphas, $Mn_3P_2O_8.7H_2O = 480{\cdot}982$.

Dose.—1 to 5 grains (**0·06 to 0·3 Gm.**).

A white powder, generally with a pinkish tint, insoluble in water. From ½ to 1 grain is given in 1 drachm of syrup of ferrous phosphate.

Manganesii Sulphas, $MnSO_4 + 4H_2O = 223{\cdot}054$.

Dose, of powder, 2 to 10 grains (**0·12 to 0·6 Gm.**).

A white powder with a faint pink tint, due to a little manganic sulphate or in pink crystals. ***Soluble*** about 1 in 1½ water. For jaundice 60 grains is a cholagogue purgative ; not reliable, may cause sickness.

Potassii Permanganas. $K_2Mn_2O_8 = 316{\cdot}06$. (*Off.*)

Dose.—1 to 3 grains (**0·06 to 0.2 Gm.**) in well-diluted solution, or in pill. **Capsules** contain 1 grain (**0·06 Gm.**).

Manufacture.—May be prepared by oxidising manganese dioxide by the aid of potassium chlorate in the presence of potassium hydroxide. Electrochemical method : By oxidation of the Manganate in an electrolyser. Surrounding the anode is a solution of Alkali and round the cathode is a solution obtained by lixiviating the melt of Manganese Dioxide and Potassium Hydroxide (Manganate). Dichromates, Perchlorates and Persulphates can be made similarly.—P.J. i./16,3.

Incompatible with all vegetable oxidisable matter, *e.g.*, glycerin, alcohol, sugar, fats and oils, with ammonia, ammonium salts and alkaloids.

Poisoning by 15 to 20 Gm. dissolved in water : was treated both by lavage and internally with a cardiac tonic—a digitalis preparation—and also with Magnesia as the presence of hydrochloric acid was alleged. The Potassium had probably produced the toxic symptoms on the heart. *Recovery.*—L. ii./11,907.

Uses.—The **Saturated Solution** (1 in 20 of water) is strongly bactericidal, as a disinfectant its colour is an advantage. Even 1 in 1,000 is efficient, *cf.* Vol. II. It is a good deodoriser.

A dilute solution will dye white hair to a chestnut brown, but this cannot be advised.

In amenorrhœa, 1 or 2 grains, in a pill 3 or 4 times a day should be given for a few days before the time of the expected period.

For gonorrhœa 1 in 10,000 to 1 in 1,000 is used as a warm irrigation or injection.

Injectio Potassii Permanganatis, L.H., has 5 grains in 1 pint, *i.e.* 1 in 1,600 in round numbers.

It is as good (1 in 1,000 solution) as silver preparations. In place of injection irrigation (JANET'S METHOD) is often used. In cases seen early before acute inflammatory symptoms and purulent discharges have appeared, abortive treatment is sometimes successful, but not likely to succeed after 24 hours. This consists of irrigation of the anterior part of the urethra with this solution.—C. F. Marshall.

Irrigation with Permanganate for gonorrhœa in a field ambulance—no definite strength adhered to as the urethra gradually acquires toleration to it.—E. T. Burke, L. i./17,756.

For cholera and dysentery rectal injection 4 grains to the pint is used, also *per os* as drink and pill.—*vide infra.*

In ozæna a spray of the Liquor 5 minims with Sodium Chloride 5 grains to the ounce of water is useful.—H. Tilley.

Gonorrhœal conjunctivitis in the adult treated by prolonged unintermitting stream of 1 in 15,000 to 1 in 20,000 solution.—L.i./12,91.

Gargle, Mouth Wash, or Vaginal Injection 1 in 5,000 of water is useful.

The solution is very nauseous to the taste. Useful for applying to foul ulcers and patches of gangrene, and to carbuncles as mild caustic.

In bromidrosis, wash the feet first in benzene, then in 1% permanganate (at night). Powder (during the day) with Potassium Permanganate 13, Alum 1, Talc 50, Zinc Oxide 18, Zinc Chloride 18. Bath of borax and benzoin also useful.

Offensive breath. 1 or 2 grains in a glass of soda water taken on an empty stomach is a certain cure.

Snake bite lancets (Brunton's) are prepared containing the crystals.

Directions.—Squeeze the part so as to press out the venom, then cut with the lancet, making several incisions deeper than the bite, and rub in the dry crystals thoroughly, moistening with water if necessary Tie a ligature or handkerchief between the bite and the heart as soon as possible to prevent the venom getting into the circulatory system. Equally good in all kinds of snake bite.

If a tube of ethyl chloride is at hand spray the part whilst making incisions.

Scorpion stings are best treated by ammonia or an evaporating lotion to the affected part, also Potassium Permanganate as in snake bite.—L. Brunton, L. ii./15,200.

SCORPION STINGS treated by a few drops of strong Potassium Permanganate solution injected round about the part.—A. S. Gubb, B.M.J. i./23,41.

A case of Adder Bite, treated with Potassium Permanganate Crystals, hot rectal injections of Normal Saline, hypodermic of Strychnine and 10 Cc. of Normal Horse Serum thrice daily—recovery.—B.M.J. i./12,420.

VOMITING OF PREGNANCY has been treated by 2 to 4 grains Potassium Permanganate in a cachet, giving immediately afterwards 3 to 4 ounces of water. Patient keeps this in the stomach 10 to 20 minutes—lying very still—then a pint or more of warm water. If necessary a further 1 grain of Permanganate per hour.

TUBERCULOUS FISTULÆ and dactylitis have been treated by packing with the crystals twice a week.

TUBERCULOUS ULCERS yield to potassium permanganate 1 drachm to the ounce, followed by Starch Iodide (Pasta Amyli Iodidi, *q.v.*).

Isolated LUPUS nodules have been treated by applying saturated solution or by boring holes with wooden skewer, filling with permanganate and moistening the surface with water and repeating a few hours later, using novocain and adrenalin.

SLOUGHING and TETANUS-INFECTED WOUNDS according to Sir Leonard Rogers may be well treated with not less than 1 in 500 Potassium Permanganate Solution. Worthy of trial in the field for irrigating all earth and dust infected wounds.—B.M.J., Dec. 19,14.

CHOLERA treated by 2 grains of Potassium Permanganate every ½ hour for 2 hours, then 1 pill every ½ hour. These are continued until the stools become green and less copious—this is usually attained in 12 to 24 hours. A weak solution (1 to 6 grains per pint) of Calcium Permanganate is allowed as a drink. 50 grains of permanganates by the mouth in 24 hours have been given without harm, and even larger doses would probably be tolerated—in addition hypertonic saline injections (*q.v.*).—B.M.J. i./11,760.

War wounds have been treated by the powdered permanganate.

The immediate application of a solution of Permanganate 1 in 1,000 will prevent the occurrence of VENEREAL DISEASE. The knowledge might undermine the moral fibre of the nation.'—H. Wansey Bayley, B.M.J. i./21,33. Its evils, *ibid* 66.

STYPTIC FOR SEROUS SURFACES. In cases of hæmorrhage from superficial wounds of these surfaces after separation at adhesions, a few crystals applied in a fold of lint—or muslin—with forceps causes blood coagulation. Bleeding stops at once. Oxygen is evolved.—J. Dsirne, L. i./21,1380.

SMALLPOX, Potassium Permanganate in saturated solution (5%), useful for painting the body. If skin sensitive, use 1·5%. In confluent cases patient put in a bath of this 5% solution, at body temperature, for 10 minutes. Reduces smell and sloughing.—L. ii./22,1193.

Epidermophytosis, intertrigo, ECZEMA MARGINATUM and eczematoid ringworm well treated by solution 1 in 5,000 gradually increased.—S. Feldman and B. F. Ochs, per Jl. Trop. Med., June 1/23,198.

Pilula Potassii Permanganatis. 1, 2, 3, 4 or 5 grains with Kaolin Ointment, *q.s.*

Caution! Avoid mixing any easily oxidised substance, like sugar, glycerin, &c. The pills may be coated with sandarach solution.

Tablets contain 1, 2 and 3 grains. To be dissolved.

'**Solubes**' 5 grains for preparing lotions and vaginal injections; to be dissolved in ½ a pint or more of water.

Lotion 'Sterules' of Potassium Permanganate contain 8·75 grains. 1 diluted to 1 pint produces a 1 in 1,000 solution.

Permanganate Tablets for purifying Drinking Water. (Laurent's).

To each litre of water add Potassium Permanganate 0·03 Gm. and Powdered Alum 0·06 Gm. After standing 5 minutes, if the solution is not pink add another tablet or two. Remove excess of Permanganate by Sodium Hyposulphite 0·03 Gm. and dried Sodium Carbonate 0·06 Gm. After 10 minutes pass through cotton wool. Ingredients may be in tablet form.—P.J. i./15,124.

Calcii Permanganas. $Ca(MnO_4)_2+5H_2O=368·01$.

Dose.—¼ grain (**0·016 Gm.**) in **Pills** or **Capsules** (with Liquid Paraffin as vehicle) thrice daily one hour before meals.

Deliquescent crimson crystals preferred for making mouth lotions, as it has less taste than the Potassium Salt. It was introduced in the 'fifties' by the late H. B. Condy. 1 in 100,000 sterilises water in 5 minutes; more powerful than the latter.

Internal use in rodent ulcer, beneficial even on recurrence after X-ray treatment. Gastric ulcer with usual symptoms greatly improved. In gastritis excellent results with ¼ grain doses and plenty of water. Effect ascribed partly to the oxidising power and partly to the nutrient effect of the calcium.—G. Arbour Stephens, B.M.J. ii./09,1674.

Calcium Lactate and Iodide found most effective in removing warts from the hands—put down to an alteration in the constitution of the blood produced by Calcium salts, as found previously by the same authority in case of chilblains and chronic ulcers. The next step (to find if possible some cure for rodent ulcer), was an inspection of the Periodic Law Table and lead to Manganese. The use of Calcium Permanganate resulted in disappearance of ulcers in several cases and greatly improved a bad case, removing offensive odour.—G. Arbour Stephens.

In cholera dilute solution as drink. *Cf.* Potassium Permanganate.

Sodii Permanganas.

$Na_2Mn_2O_8=283·86$. In solution, red in colour, is used as a cheap disinfectant. ✱**Condy's Red Fluid** (T.M. Condy's &

Condy's Fluid Co. 25750) contains this salt. This manufacturers' **Green Fluid** has Sodium Manganate Na_2MnO_4=164·93 in solution.

Zinci Permanganas.

$Zn(MnO_4)_2+2H_2O$ = 339·262. Deliquescent brown crystals; for lotions and injections, 1 grain in 8 ounces (1 in 4,000), where the astringent action of the zinc is indicated. As an eye wash 1 in 1,000 to 1 in 2,000. **Injectio Zinci Permanganatis, L.H.** (Urethral). Has ½ grain in 3 ounces (1 in 2,625).

For gonorrhœa excellent.—Campbell Williams.

For pyorrhœa alveolaris and oral sepsis as mouth wash it is very useful. **'Solubes'** ¼ grain each to make 2 ounces of solution.

'Collapsubes' with catheter attachment, of Zinc Permanganate in Soft Paraffin; strength 1 in 2,000 for use in chronic gonorrhœa.

Zinc Permanganate Bougies, 4 inches long, containing ½ grain (0·03 Gm.) in Theobroma Oil basis are prepared.

MANGANESE POISONING—cases described.—per Clin. Jl., May 16/23,233.

MENTHOL.

METHYL-PROPYL-PHENOL HEXAHYDRIDE. $C_{10}H_{20}O$=158·21.

Dose.—½ to 2 grains (**0·03 to 0·12 Gm.**) or more in a pill with powdered soap, or in solution in olive oil.

A white crystalline substance deposited on cooling **Oil of Peppermint** *q.v.* Obtained from *Mentha arvensis, vars. piperascens et glabrata*, and *M. piperita* (*Labiatæ*), it melts at 44° C. (*Off.* 42 to 43°).

Soluble 5 in 1 of 90% Alcohol, also in Ether 2 in 1, Chloroform 4 in 1 approximately, 1 in 4 of Olive Oil, and in Petroleum Spirit 10 in 7. Sparingly soluble in water, insoluble in glycerin. Soluble on warming in a strong solution of Sodium Salicylate, but throws out again.

Uses.—Given internally, it acts as a diffusible stimulant. Of value in the vomiting of pregnancy and other forms. Its solutions, applied to the skin, affect the nerves of the part somewhat like aconite, and form useful pigments for headache, rheumatic pains and neuralgia. It has antiseptic and anæsthetic properties, and gives great relief in prurigo, urticaria and pruritus ani. It liquefies when gently rubbed on the painful part.

As an antineuralgic in toothache and for sciatica 1 in 60 of Alcohol with a little Clove Oil, is employed; also Menthol Cones. The crystals on cotton wool may be placed in the hollow of an aching tooth.

Caution.—It is dangerous to apply an ointment containing Menthol to the nostrils of infants, *e.g.*, for treatment of catarrh,—may cause instant collapse.—*Cf.* Camphor.

Menthol liquefies with an equal amount of either Carbolic Acid, Chloral Hydrate or Thymol, also 3 parts of Menthol and 2 parts of Camphor, 2 parts of Menthol and 1 part of Butyl Chloral Hydrate, and 2 parts of Menthol, with 1 of each Phenol and Butyl Chloral Hydrate. These will relieve toothache. Its Camphor and Phenol combinations* are used to medicate **oro-nasal 'Ozonic' and the Nasal**

* Ⓟ**Menthophenol.** Menthol 3, Phenol 1. Useful as gargle; 15 drops to the tumbler of water.

'**Ozonic**,' and other dry inhalers, and are most beneficial for arresting and curing colds, and relieving influenza and chest affections.

For the inhalation of hot medicated moist air the '**Portable**' and '**Poor Man's Inhaler**' may be used *cf.* Creosote and other vapours.

Menthol—Camphor and other combinations, diluted with a heavy mineral oil, for spraying into the nares or in spirituous solution, inhaled as above, relieve swelling and irritability of nasal catarrh, contracts capillary blood-vessels of mucous membrane, reduce swelling, relieve pain and fulness of head, arrest sneezing, check excessive discharge, and correct perverted secretion. *cf.* Nebulæ.

Aqua Mentholis. Menthol 1, Alcohol 15, Distilled Water 1,000.

Menthol Plasters, 10 to 15% in a suitable basis (℗ if Lead basis) are useful for rheumatism and intercostal neuralgia.

Injectio Mentholis.

Menthol 0·5, Liquid Paraffin 100. For use with an Eustachian catheter to the middle ear.

Sterules, Hypodermic, of Menthol contain $\frac{1}{5}$ grain (**0·012 Gm.**) in 40 minims of Liquid Paraffin.

Insufflatio Mentholis. Menthol 1, Ammonium Chloride 3, Boric Acid 2, and Lycopodium 6, relieves nasal catarrh.

℣ ℙ1 **Insufflatio Menthol et Cocainæ R.F.H.** Menthol 3 grains, Cocaine Hydrochloride $\frac{1}{2}$ grain, Boric Acid Powder $\frac{1}{2}$ ounce, Bismuth Carbonate $\frac{1}{2}$ ounce.

℣ ℙ1 **Pulvis Mentholis et Cocainæ Compositus.** *Syn.* POUDRE CONTRE LE CORYZA. FR. CX. SUPP., 1920.

Menthol 1, Cocaine Hydrochloride 0·5, Bismuth Salicylate 45, Boric Acid 50·5.

℗**Linimentum Mentholis.**

Menthol 3, Chloroform 4, Olive Oil *q.s.* to 16; is useful in lumbago, neuralgia, sciatica, and ringworm.

ℙ1 **Linimentum Mentholis Compositum.**—S. H.

Menthol 3, Tincture of Aconite 4, Chloroform 4, Soap Liniment 5.

In pruritus Menthol 1, Camphorated Alcohol, Chloroform and Ether of each 3 "dabbed on" lessens irritation.

Menthol-Paraffin Capsules contain a saturated solution of menthol in liquid paraffin. These have elongated ends, which can be torn off, and the contents dropped into the ear to abort boils and to relieve earache.

Mentholeate. Menthol and Oleic Acid *p. æquales.* Heat gently to dissolve. Useful in pruritus, etc., where absorption is desired.

Pastillus Mentholis, T.H., contains $\frac{1}{6}$ grain.

Pigmentum Mentholis.—1 to Olive Oil 4. Painted or injected into the larynx, or even the trachea, useful in phthisis, and laryngeal disease. Also applied on wool for ear affections.

Nebula Mentholis, 0·5 to 2% in liquid paraffin or Olive oil is used for spray or pigment for throat. Relieves acute laryngitis.—Tilley.

Vapor Mentholis Citriodoratus.

Menthol, Eucalyptus Oil (from variety E. *Citriodora*), Eau de Cologne, and Alcohol 90% of each, equal parts.

A little inhaled, *e.g.*, from an Ozonic Inhaler or the handkerchief, is valuable for nasal catarrh and influenza.

Unguentum Mentholis (3%) **et Camphoræ** (2%). Hay fever is well treated with, applied to the nasal passages in small quantity.

Pigmentum Mentholis cum Guaiacol. Menthol 1 grain, Guaiacol in crystals 1 grain, Oil of Almonds to 1 ounce.

In acute tonsillitis brushing with Menthol and Guaiacol (10% Menthol and 3 or 4% Guaiacol in Olive Oil) often has a good effect.—Dundas Grant, Pr. Mar. 1912.

Tabellæ Mentholis. *Dose.*—1 or 2, *ad libitum.*

Contain $\frac{1}{5}$ grain menthol, combined with chocolate.

Pilula Mentholis. $\frac{1}{2}$ to 2 grains, Mass with Powdered Soap or half its weight of White Wax previously *just* melted.

℗ **Tinctura Menthol Ætherea,** for local application.

Menthol 1, Purified Ether 4, and Chloroform 4. In neuralgia.

Gossypium Mentholis. 10%. Saturate Cotton Wool 85 with Menthol 10 and Liquid Paraffin 5 in Ether 265 and spread out to dry. Useful to plug the nose in nasal catarrh.

Menthyl Valerianate. ✱Validol. *Dose.*—10 to 15 minims (0·6 to 1 Cc.).

Trade Mark 216165. Patent 3706/1896 now ***void.***

The specification contained in the patent method is so exceedingly vague as to lead one to assume that this is not a definite compound.

It is admitted to be a mixture of Menthol and Menthol Valerianate. Commercially we find the preparation apparently a solution containing about 25% menthol in Menthyl Valerianate. To make true Menthol Valerianate one would proceed by the customary methods of producing esters, *e.g.* :—

(1) Valerianyl Chloride to interact with Menthol with the application of heat; or (2) The passage of dry gaseous Hydrochloric Acid into a mixture of Menthol and Valerianic Acid in equivalent quantities to saturation point—the mixture being heated with reflux condenser during the process.

The product to be finally washed free of Hydrochloric Acid.

A colourless liquid with agreeable odour and free from burning taste of menthol. Nerve Sedative. Used in sea-sickness.

🅱 🅿1 MORPHINA. Fr. Cx.

$C_{17}H_{17}NO(OH)_2,H_2O = 303{\cdot}261.$

🅱 *Morphine and Diamorphine (commonly known as Heroin) and their respective salts, preparations and substances containing not less than one-fifth per cent. (one part in five hundred) of anhydrous morphine or one-tenth per cent. (one part in a thousand) of diamorphine. See also Opium.*

Dose.—$\frac{1}{10}$ to $\frac{1}{3}$ grain (0·006 to 0·02 Gm.).

This, the principal alkaloid of opium, is in a white powder, or in white, shining crystals, ***Soluble*** in water about 1 in 5,000, slightly in ether and alcohol 90%; glycerin 1 in 150, oleic acid 1 in 10; solutions of its salts are precipitated by ammonia and by

potash (but re-dissolve in the latter). It loses about 6% of its weight on drying at 90° C., 3 parts of Morphine are reckoned approximately equal to 4 parts of the Acetate, Hydrochloride, or Sulphate.

Solubility in chloroform by heating at 105° C. is increased.—Dott.

Hydrated Morphine is soluble 1 in 5,000 water at 20° C.

Morphine was discovered by Sertürner 1806 or possibly earlier by Dérosne (1803).—B.M.J. i./21,59.

Constitution of the Morphine molecule and other members of the group. See Watt, Science Progress, Oct., 1909.

Incompatibility.—Morphine salts are decomposed by alkalis, and solutions are precipitated by vegetable compounds containing tannin, also with iron, lead, manganese, silver, copper, and zinc salts, Liquor Arsenicalis, and potassium permanganate.

The alkalinity of glass bottles (especially colorless) may throw out a very appreciable amount of morphine from a solution of a salt.

Antidotes.—Emetics should first be given and the stomach tube used. Wash out the stomach with Potassium Permanganate Solution; give strong hot coffee, or Ammonia, or Ether, Amyl Nitrite inhalation. Powdered Charcoal in Water *ad lib.* Physiological antidotes are Belladonna and Atropine. $\frac{1}{20}$ grain of the latter antagonises 1 grain Morphine (draw off the urine with catheter frequently). The following have also been given with good effect hypodermically :—Nitroglycerin, Picrotoxin, Pilocarpine, Strychnine. Oxygen inhalation, Saline solution intravenously and Brandy *per* rectum.

Potassium Permanganate as an oxidising antidote for many alkaloidal poisons. Should be used with stomach pump and emetics—more potent than physiological antidotes.—B.M.J. i./12,396.

Morphine Suppository (1 grain) given in place of Glycerin—to infant 4 months, recovery under permanganate per rectum, and syphoned into the Stomach.—B.M.J. i./12,724

Atropine $\frac{3}{10}$ grain in doses of $\frac{1}{10}$ grain at intervals brought recovery where 4 grains of Morphine had been injected.—B.M.J. i./05,1040.

Opium Poisoning treated by Faradic Current.—L. i /12,1120.

Opium and morphine may poison infants through the mother's milk.

Poisoning by apparently 7 grains of Morphine and $\frac{1}{8}$ grain Atropine (combined). Treatment.—Stomach washed out with Permanganate. Injections of Strychnine and bleeding. Death.—B.M.J. i./13,1271.

Flavoring of liquid preparations of Morphine.—Glyl Rosæ, Syl Amygdalæ Amaræ; Syrupus Aurantii.

Uses of Morphine Salts.—General and most useful sedative and anodyne for all purposes, but may cause indigestion and constipation. Must be given with care to children. Employed in diabetes, but Codeine generally preferred. May be given in renal cases. —For restless painful nights with cardiac dyspnœa. Give a small dose at first.

Hæmoptysis is well treated by $\frac{1}{6}$ to $\frac{1}{2}$ grain hypodermically.—W. W. W.

Puerperal eclampsia well treated.—B.M.J. ii./03,1212.

Acute uræmia occurring with a chronic parenchymatous nephritis cured by Morphine and Atropine. The urine was almost solid with albumin. Venesection and Oxygen also employed.—A. H. Carter, B.M.J. ii./12,1181.

Mania may be treated by ½ grain dose with chloroform in addition. The two together produce deep sleep lasting several hours. Either alone is comparatively of little avail.

For children. Contrary to usual opinion, experience in more than 300 cases showed that Morphine is well tolerated by the young. It is preferable to the various Opium preparations. The initial dose is 1/10 milligramme per kilo of weight hypodermically. In children of 8 to 12 years 0·005 to 0·01 Gm. of Morphine Hydrochloride with Atropine was given. No bad results.—P.J. ii./12,810.

Morphine Tablets under the tongue instead of ½ grain hypodermically found unsatisfactory on the "Tiger" in the Jutland Battle.—B.M.J. ii./16,597.

Cardiac Asthma, acute attacks. Morphine ⅓ grain subcutaneously of great value.—Claude Wilson, L. ii./23,1346.

In **Morphine Habit,** Sparteine Sulphate is recommended to gradually replace the Morphine solution, commencing with ½, increased to ⅔ grain, four to six times a day. Sodium Bromide and Nitroglycerin Tablets are useful, *q.v.* Camphor has been given to relieve the craving; also Heroin and Dionin.

Gamgee on chronic morphinism and its treatment. For the insomnia of morphinism give Veronal, for the circulatory and respiratory troubles give full doses of Digitalis Tincture, repeated hypodermic Strychnine (1/30 grain) injections and cupping glasses to the region of the heart. For the gastric catarrh Bismuth Carbonate (as much as 5 Gm.) first thing in the morning, with directions to change resting position as is done in treatment of gastric ulcer. —L. ii./08,796.

Turkish baths, heart tonics and Sodium Bicarbonate, *e.g.*, as Vichy Water with gradual weaning from the Morphine by the patient himself. With these exceptions, 'drugs,' especially hypnotics, should be little used. The habit can be "knocked out" in a relatively short time by Hyoscine and Atropine. Sparteine useful, also Bromide.—O. Jennings, B.M.J., ii./11,812,L. ii./11,506.

A combined medicinal and hypnotic treatment for nine weeks in a home employing Sodium Bromide.—B.M.J. ii./10,1595,2007.

Morphinomania cured by Hyoscine. A severe case in which patient was taking 6 to 10 grains of Morphine Sulphate daily, and on one occasion 12 grains in 24 hours, cured by Hyoscine. During 8 days the patient had in all Hyoscine Hydrobromide 47/200 grain, Morphine 1¼ grains, Sodium Bromide 270 grains and Syrup of Chloral 20 drachms.—W. K. Anderson, Pr., June, 1912, per Pres., Oct., 1912, p. 255.

Morphine habitués and effects of military service in France. Morphinists may be good fighters if allowed an adequate supply.—L. ii./15,139.

Morphine in China. Unsatisfactory conditions of the Customs regulations and absence of adequate pharmacy law.—G. L. Tuck, L. i./17,874.

BERBERINE in dose of 0·1 to 0·2 Gm. in conjunction with Helenium has been used.

A suicide's statement of his sensations of Morphine (and cyanide) poisoning. —P.J. ii./22,218.

The morphinist is not a mental defective. Drug addiction does not lead to insanity or serious nervous diseases needing custodial care, but it makes the habitué more dangerous to society. It is not difficult to recognise drug addicts in society. Chief characteristics: plausibility and disorderliness. They lie for the sake of lying. They can work and write under the drug but disjointedly and in slovenly fashion.

15 *grains* of Morphine is an ordinary quantity for a morphinist to use in the 24 hours, though the same person will double this dose in case of any small imaginary trouble. The addict will probably never give information leading to disclosure of his source of supply. Results of withdrawal are described. Difficulties of treatment. The temperance is dependance on self control, not on control by others.—W. E. Dixon, B.M.J. ii./21,821. *See also Prof. Dixon under Heroin, Opium, Cocaine.*

EMETINE HYDROCHLORIDE, in the treatment of alcoholism and the Morphine habit. Three doses each $\frac{1}{6}$ grain (0·01 Gm.) per day for the first month or two; afterwards $\frac{1}{6}$ grain twice daily for Morphine patients. For alcoholism $\frac{1}{3}$ grain every other day.—M. Vivian, M.P.C., Nov. 29/22,448.

Emetine Hydrochloride Sterules contain $\frac{1}{6}$, $\frac{1}{4}$ and $\frac{1}{2}$ grain. 'I have found the $\frac{1}{4}$ grain Emetine Sterules most useful in my patient's case. Two days before I got them he was very sick and had dry retching and could take no food. I gave him one Sterule twice a day. The first settled his stomach and also enabled him to take less of the Morphine.'—A private communication.

What is wanted is international agreement on ***restriction of production.***—Rt. Hon. E. Shortt, Sec. of State for Home Dept., May 16/22.

See also Cocaine, Morphine, Heroin, Nicotine and Opium for further consideration of the subject.

℞ ℙ1 **Oleatum Morphinæ.** Morphine 1, Oleic Acid 60. Dissolve.

Oleic acid will dissolve as much as one-tenth of its weight of pure morphine. Morphine is added to oleate of mercury to relieve pain.

℞ ℙ1 **Morphinæ Acetas, Morphine Acetate** (*Off.*)

$C_{17}H_{19}NO_3$, $C_2H_4O_2$,$3H_2O$ = 399·335.

Dose.—$\frac{1}{8}$ to $\frac{1}{2}$ grain (**0·008 to 0·03 Gm.**), which may be increased.

A white powder, ***soluble*** 1 in $2\frac{1}{2}$ of water, also about 1 in 100 in Alcohol 90%, Glycerin 1 in 5.

℞ ℙ1 **Injectio Morphinæ Acetatis Hypodermica,** *Martindale.*

1 grain in 6 minims. *Dose.*—1 to 2 minims.

Dissolve the Morphine Acetate in freshly boiled distilled water in the above proportion. Two or three drops of Acetic Acid (*Off.*) may be necessary if the morphine salt be not very fresh. Thus made, a bottle of the injection has kept in good condition for a long time. Sulphurous Acid 1 minim to the ounce will prevent the slight darkening which will ultimately occur. A few drops of glycerin added will prevent the salt incrustating on lip of the bottle.

On account of the small quantity of liquid, this injection (1 *grain in* 6 *minims*) is preferred. **Caution.**—Carefully distinguish this from the B.P. 1898 injection, Morphine Tartrate (1 *grain in* 22 *minims*), and the *Off.* (1914) injection which is 1 *grain in* 44 *minims.*

℞ ℙ1 **Injectio Morphinæ et Atropinæ Hypodermica,** *Martindale.*

Contains Atropine Sulphate 1 grain in 3 drachms of Injection of Morphine Acetate (1 grain in 6 minims).

Dose.—1 to 3 minims, 3 minims contain half a grain of morphine acetate and $\frac{1}{600}$ grain of atropine sulphate. The atropine increases the sedative action and counteracts the disagreeable effects of the morphine on the head, stomach, and bowels.

℞ ℙ1 **Ophthalmic Discs** are made containing $\frac{1}{500}$ grain **Morphine** and $\frac{1}{500}$ grain **Morphine** with $\frac{1}{5000}$ grain **Atropine** respectively.

℞ ℙ1 **Liquor Morphinæ Acetatis** (*Off.* and B.P. 1898).

Dose.—10 to 60 minims (**0·6 to 4 Cc.**).

Morphine Acetate 1, Diluted Acetic Acid 2, Alcohol (90%) 25, Distilled Water to 100.

℗ **Pastillus Morphinæ Acetatis** ($\frac{1}{30}$ gr.), *v.* Pastilli.

℞ ℙ1 **Pastillus Cocainæ** ($\frac{1}{15}$ gr.) **et Morphinæ** ($\frac{1}{30}$ gr.).

℞ ℙ **Morphinæ Hydrobromidum.**
$C_{17}H_{19}NO_3.HBr.2H_2O = 402{\cdot}205$
Dose.—$\frac{1}{8}$ to $\frac{1}{2}$ grain (**0·008 to 0·03 Gm.**).
A white powder, soluble 1 in 22 of water and about 1 in 50 alcohol 90%. Given with hydrobromic acid as sedative, affects the head less.

℞ ℙ **Morphinæ Hydrochloridum.** *Off.*, **U.S.**, **Fr. Cx.**, $C_{17}H_{19}NO_3HCl.3H_2O = 375{\cdot}761$.
Dose.—$\frac{1}{8}$ to $\frac{1}{2}$ grain (**0·008 to 0·03 Gm.**), which may be increased.
In silky white crystals or in powder soluble 1 in 25 of water, about 1 in 67 of alcohol 90% (by expt.), and about 1 in 8 of Glycerin.

℞ ℙ **Guttæ Morphinæ et Cocainæ (Aural)**, Morphine Hydrochloride 4 grains, Cocaine Hydrochloride 24 grains, Glycerin 1 drachm, Distilled Water to $\frac{1}{2}$ ounce. *N.B.—A potent preparation.*

℗ **Linctus Morphinæ, U.C.H.**
Solution of Morphine Hydrochloride 3 minims, Chloroform Emulsion 3 minims, Treacle 60 grains, Water to 1 drachm. May be more agreeably flavoured with syrup of lemon.

Dose.—A teaspoonful 3 or 4 times a day ; repeated frequently when cough is troublesome. Taken undiluted, swallowed very slowly. *For children* of 8 to 14 years, dose 10 to 20 drops. Not suitable for very young children, or where there is difficulty of expectoration in bronchitis.

℗ **St. M.'s H.** has Morphine Hydrochloride Solution 10 minims Honey $\frac{1}{2}$ drachm, Water to 1 drachm.

℗ **Linctus Morphinæ, C.X.**
Solution of Morphine Hydrochloride 2 minims, Spirit of Chloroform 2 minims, Ipecacuanha Wine 2 minims, Mucilage of Acacia $\frac{1}{2}$ drachm, Water to 1 drachm.

℗ **Linctus Morphinæ Hydrocyanicus** (Ogle's Drops), St. G. H.
Dilute Hydrocyanic Acid 1 minim, Solution of Morphine Acetate 3 minims, Oxymel of Squills to 1 drachm.

℞ ℙ **Guttæ Rosæ.**
Dose.—2 to 10 minims (**0·12 to 0·6 Cc.**).
Morphine 1, Citric Acid 0·5, Cochineal Tincture 8, Water to 50. For cough,—a useful name and method of giving the drug.—Ph. Notes (Denmark, modified).

℗ **Mistura Morphinæ et Phenazoni Composita,** *Martindale.*
Dose.—1 ounce (**30 Cc.**).
Solution of Morphine Hydrochloride 10 minims, Phenazone 10 grains, Tincture of Castor 20 minims, Spirit of Chloroform 10 minims, Syl Lavandulæ 1 drachm, Mucilage and Water to 1 ounce.
This is virtually a specific for spasmodic dysmenorrhœa.—W.W.W.

℗ **Mistura Tussi Rubra.** *Dose.*—$\frac{1}{2}$ to 2 drachms (**2 to 8 Cc.**) in a little water. Hydrobromic Acid 5 minims, Morphine Hydrobromide $\frac{1}{3\,2}$ grain, Diluted Hydrocyanic Acid $\frac{1}{8}$ minim, Spirit of Ether 5 minims, Tincture of Cudbear 5 minims, Syrup to 1 drachm. This forms a popular winter-cough mixture.

℞ ℙ1 **Liquor Morphinæ Hydrochloridi** (*Off.* and B.P. 1898).
Dose.—10 to 60 minims (**0·6 to 4 Cc.**).
Morphine Hydrochloride 1, Diluted Hydrochloric Acid 2, Alcohol (90%) 25, Distilled Water to 100.
The Hydrochloric Acid is excessive and 20% of alcohol would be enough.—D. B. Dott, P.J. i./15,206.

℞ ℙ1 **Soluté de Morphine chlorhydrate pour injection hypodermique.**
Fr. Cx. 2%.

℗ **Mistura Anodyna, N.H.W.** (Not in E.G.A.)
Solution of Morphine Hydrochloride 20 minims, Sal Volatile ½ drachm, Water to ½ ounce.

℗ **Pulvis Morphinæ Effervescens.**
Dose.—1 or 2 of the following during the day. Morphine Hydrochloride ⅕ grain, Potassium Bromide 10 grains, Antipyrin 10 grains, Citric Acid 40 grains, Tartaric Acid 40 grains, Sodium Bicarbonate 1 drachm, Lactose 1 drachm. For one effervescent powder. Very serviceable in dental neuralgia.—M.P.C., July 21/09,68.

℞ ℙ1 **Suppositoria Morphinæ.**
Morphine Hydrochloride ¼ (*Off.*) also ½, 1, 1½, and 2 grains (taking weight of the suppository as 15 grains).

℞ ℙ1 **Tablets, Hypodermic,** contain ⅙, ¼, ½ and 1 grain.

Trochisci Morphinæ et Emetin *v.* Emetin.

℗ **Trochisci Morphinæ et Ipecacuanhæ** (*Off.*).
Contain $\frac{1}{32}$ grain (**0·002 Gm.**) of Morphine Hydrochloride, with $\frac{1}{10}$ grain (**0·006 Gm.**) of Ipecacuanha in each. Useful to allay cough.

℞ ℙ1 **Morphinæ Hypophosphis.**
$C_{17}H_{19}NO_3.HPH_2O_2 = 351·309$. *Dose.*—⅛ to ½ grain (**0·008 to 0·03 Gm**).
A white powder *soluble* 2 in 1 (by expt.) of water and about 1 in 14 of Alcohol. Should be a very useful salt for injection owing to its great solubility.

℞ ℙ1 **Hypodermic Tablets** contain ¼, ⅓, ½ and 1 grain.

℞ ℙ1 **Morphinæ Meconas,**—Morphine Meconate. *Syn.*—incorrectly Morphine Bimeconate. (Solid Bimeconate is impossible.)
$(C_{17}H_{19}NO_3)_2C_7H_4O_7+5H_2O=860·637$.
Dose.—⅛ to ½ grain (**0·008 to 0·03 Gm.**).
This, one of the natural salts of morphine in opium, is in white minute acicular crystals, soluble in 1 in 34 of water. It is said to disturb the head less as well as to derange the stomach less, than the other salts.

℞ ℙ1 **Liquor Morphinæ Bimeconatis.**
Dose.—5 to 40 minims (**0·3 to 2·4 Cc.**).
Morphine (pure Alkaloid) 14½ grains, Meconic Acid 12 grains, Alcohol (90%) 1 ounce. Mix and add Distilled Water to 4 ounces. Filter. One ounce contains about 6·3 grains or 1·45% (*w/v*) of morphine bimeconate. It is about the same strength as tincture of opium.

℞ ℙ1 **Pills** contain ¼ grain.

℞ ℙ1 **Tablets, Hypodermic,** contain ⅛ and ¼ grain.

Ⓑ Ⓟ1 Morphine Periodide. $C_{17}H_{19}NO_3.2I = 539{\cdot}085$. (apparent composition).

Dose.—$\frac{1}{16}$ to $\frac{1}{8}$ grain (**0·004 to 0·008 Gm.**).

When made by interaction of Morphine base and Iodine in suitable solvent (*cf.* Alkaloidal Periodides), this compound is obtained as a yellowish-brown powder containing 52·9% Morphine, according to investigations in the author's laboratory (1923).

It will be noticed that while a considerable proportion of Morphine is dissociated in the presence of Physiological Acid (17·1% of the Periodide), a considerable quantity (9·1% of the Periodide) is liberated on subsequent treatment with Physiological Alkali.

Solubility.—Soluble in Alcohol, very slightly soluble in Chloroform, insoluble in Ether and water.

Incompatible with alkalis, salts of heavy metals and otherwise as alkaloids.

Pharmacology:—

Doses of $\frac{1}{16}$ and $\frac{1}{8}$ grain were taken by two of the author's assistants (F.G.D. and A.J.F.) Jan. 1924. No discomfort, and no untoward symptoms observed.

Uses.—The presence of Iodine, to the extent of 47·1%, in this body in a free or nascent condition may enhance the efficacy of the Morphine in it as an anodyne sedative remedy. As a remedy for sleeplessness due to painful affections it is equivalent in effect to other Morphine compounds.

Dispensing Note. To be given alone, in cachet or 'slipule' after food.

Ⓑ Ⓟ1 Morphinæ Sulphas, $(C_{17}H_{19}NO_3)_2H_2SO_4 + 5H_2O = 758{\cdot}646$.

Dose.—$\frac{1}{8}$ to $\frac{1}{2}$ grain (**0·008 to 0·03 Gm.**).

In white silky acicular crystals. Soluble 1 in 23 of water, very slightly in alcohol 90%.

Ⓑ Ⓟ1 Hypodermic Tablets contain $\frac{1}{8}$, $\frac{1}{6}$, $\frac{1}{4}$, $\frac{1}{3}$, $\frac{1}{2}$ and 1 grain; also combined with **Atropine** as follows:—

Morphine Sulphate	$\frac{1}{8}$,	$\frac{1}{8}$,	$\frac{1}{6}$,	$\frac{1}{4}$,	$\frac{1}{4}$,	$\frac{1}{3}$,	$\frac{1}{2}$,	$\frac{1}{2}$ gr.
Atropine Sulphate	$\frac{1}{200}$,	$\frac{1}{150}$,	$\frac{1}{180}$,	$\frac{1}{200}$,	$\frac{1}{150}$,	$\frac{1}{120}$,	$\frac{1}{120}$,	$\frac{1}{100}$ gr.

Ⓑ Ⓟ1 Sterules, Hypodermic, of Morphine Sulphate contain $\frac{1}{8}$, $\frac{1}{6}$, $\frac{1}{4}$ and $\frac{1}{2}$ grain (**0·008, 0·01, 0·016 and 0·03 Gm.**).

Morphine and Atropine are given before anæsthesia, effected by gas and ether, to lessen the amount required and to minimise the secretion from the mouth and lungs.

Morphine Bottle for use in Warfare.

A wide-mouth bottle, 1 ounce capacity, is capped by a double layer of rubber, *e.g.*, pieces of a tobacco pouch. The syringe needle passed through obliquely can be withdrawn, whilst the aperture will close again and keep the solution ($\frac{1}{6}$ grain of Morphine Sulphate in 5 minims) clean. In alkali-free amber bottle.—B.M.J. ii./10,432.

Ⓑ Ⓟ1 Hypodermic Tablets of Morphine Hydrochloride $\frac{1}{6}$, Atropine Sulphate $\frac{1}{200}$, and Nitroglycerin $\frac{1}{200}$ grain. Used in asthma.

Ⓑ Ⓟ1 Morphinæ Tartras, Morphine Tartrate.

$(C_{17}H_{19}NO_3)_2.(CH.OH.COOH)_2, 3H_2O = 774{\cdot}606$.

Dose.—$\frac{1}{8}$ to $\frac{1}{2}$ grain (**0·008 to 0·03 Gm.**).

In small white nodular tufts of acicular crystals, readily soluble 1 in 10 of water, slightly in alcohol 90%.

℞℗1 **Injectio Morphinæ Hypodermica** (*Off.*).

Dose.—5 to 10 minims (**0·3 to 0·6 Cc.**).

Contains 2·5% of Morphine Tartrate (1 grain in 44 minims). Caution.—B.P. '98 was 5%.

℞℗1 **Liquor Morphinæ Tartratis** (*Off.* and B.P. 1898).

Dose.—10 to 60 minims (**0·6 to 4 Cc.**).

Morphine Tartrate 1, Alcohol (90%) 25, Distilled Water to 100.

℗1 **Ethyl-Morphine Hydrochloride,** P. Hung., Svec., P. Jap. IV.; Fr. Cx. Supp. II.

Syn. ✱**Dionin.** (T.M. 217175)

$C_2H_5C_{17}H_{18}NO_3.HCl.H_2O = 367{\cdot}771.$

Manufacture.—According to Von Mering's Patent (No. 13,703 of 1899), Morphine is dissolved in alkali. Caustic Soda or Sodium is added in calculated quantities and then Ethyl Bromide, *q.s.* The mixture is heated for 1 to 2 hours at 80 to 100° C. Merck's Patent 14,366 of 1901 deals with the same subject.

It may be prepared by heating Morphine with Sodium Ethylate 1 molecule and Ethyl Iodide 1 molecule.—Beilstein III., 908 (674).

We would suggest dissolving Morphine 1 molecule in Ethyl Alcohol and heating with a molecular proportion of Sodium Hydrate and a molecule of Ethyl Iodide in Ethyl Alcohol as solvent at about 60° C. in a closed vessel until interaction is complete, finally extracting with Ether and then converting the base into the Hydrochloride.

As an alternative Ethyl Sulphate in the presence of Alcohol and Sodium suggest themselves—on the lines of Merck's patent for making Codeine (D.R.P. 102,634).

British made Ethyl-Morphine has been available for some years past. We have no actual experience with the body.

Dott finds $2H_2O$ in the compound. Morphine contains one alcoholic and one phenolic OH. In this body the H of the phenolic OH is replaced by C_2H_5.

Dose.—$\frac{1}{4}$ to $\frac{1}{2}$ grain (**0·016 to 0·03 Gm.**). Maximum dose in 24 *hours*, $1\frac{1}{2}$ grains; Fr. Cx. Supp. II. says 3 grains (**0·2 Gm.**).

A white crystalline powder ***soluble*** 1 in 10 to 11 of water (*cf.* P.J. i./12,425) and 1 in 25 of alcohol 90% (by experiment). M.pt. is ill-defined. The temperature 124° C. usually given is too high for the fully hydrated salt and too low for the salt dried at 115° C.—Dott. Insoluble in ether. Recommended to replace codeine and morphine in bronchitis, pulmonary emphysema, and bronchial asthma, also for whooping-cough and for morphine habit. May be used *hypodermically* in doses of $\frac{1}{10}$ grain in 5 minims of water.

A useful anodyne in glaucoma, iritis, corneal ulcers, etc. Solutions may be from 1 to 5% strength or more.

Corneal opacities, for promoting absorption of and instillation of 5% infusion of crushed Jequirity Seeds, of value.—Lieut.-Col. H. Kirkpatrick, L. i./21,1304; see also Trachoma, Therap. Index. Dionine if used strong enough—5%—and provided a good reaction is set up—seems useful.—T. L. de Courcy, B.M.J. ii./21,737.

May cause "ophthalmic fireworks," pain, chemosis, swelling, and sneezing.

In interstitial keratitis with potassium iodide internally, and yellow precipitate ointment in the conjunctival sac of service.

℗**Guttæ Dionin** R.O.H. 1, 2, 5 or 10%.

℗**Sterules** (Ophthalmic) **of Dionin** contain 5% Solution.

℗**Sterules, Hypodermic of Dionin** contain $\frac{1}{6}$ grain (**0·01 Gm.**).

℗1 **Ethyl-Morphine** (Base), has no distinct M.pt. It is soluble about 1 in 500 Water and 1 in 1½ Alcohol at 25° C.

℗℗1 **Diamorphinæ Hydrochloridum.** *Syn.* **Diaphorm** (*Martindale*), **Diacetyl-Morphine Hydrochloride, P. Jap.** IV., **Fr.** Cx. Supp. II.

***Heroin** (T.M. 322540) **Hydrochloride** $C_{17}H_{17}(OCH_3.CO)_2NO.HCl$ = 405·765. (*Off.* + H_2O). The Hydrogen atoms of both the alcoholic and the phenolic OH groups are replaced by the $CH_3.CO$ groupings. M.pt. about 230° C. Aqueous solution must not colour blue with Ferric Chloride (absence of Morphine).

This body was first produced in London by Beckett and Wright.

Dose.—$\frac{1}{25}$ to $\frac{1}{8}$ grain (**0·0025 to 0·008 Gm.**). Maximum dose in 24 hours (P.G.) 0·015 Gm. **Fr.** Supp. II. 0·02 Gm.

In white crystalline powder, ***soluble*** about 1 in 2½ of water and about 1 in 13 of alcohol 90% (our experiments). ***Incompatibles***—Both alkalis and acids and other chemicals as morphine.

Uses.—Sedative for cough, *e.g.*, in phthisis, bronchitis, and laryngitis, also in asthma. Has been given in hæmoptysis. Lengthy use must be guarded against. Useful in acute coryza.

In hay fever the following has been recommended: Heroin $\frac{1}{12}$ grain, Atropine Sulphate $\frac{1}{200}$ grain, Caffeine Citrate 1 grain, Salophen 5 grains. In cachet, one every four hours.

Recovery after 9 grains is on record.

J. C. McWalter said it is less toxic than morphine, but not 4 times as strong in action—*cf.* B.P. doses—$\frac{1}{8}$ grain as against Morphine $\frac{1}{2}$ grain.

Flavoring.—*Vide* Morphine.

℗℗1 **Tablets, Hypodermic,** $\frac{1}{24}$ and $\frac{1}{12}$ grain.

℗℗1 **Tabellæ** $\frac{1}{10}$ grain, in chocolate basis for administration *per os.*

℗℗1 **Morphinum Diacetylicum, P. Austr.** *Syn.* Aceto-morphine. The base of the above salt. Soluble in water 1 in 800.

℗ **Glycaphorm.** *Syn.* Glycerole of Diacetyl-Morphine Hydrochloride, Linctus Heroin, Syrupus Heroin.

Contains $\frac{1}{48}$ grain Diacetyl-Morphine Hydrochloride in 1 drachm of a vehicle consisting of Glycerin 3, Syrup of Roses 4, Water 1.

Dose.—1 to 2 drachms (**4 to 8 Cc.**).

This preparation forms a useful linctus for coughs, and is employed in bronchitis, pertussis, laryngitis, asthma, and similar disorders.

℗ **Glyco-Heroin.** *Syn.* **Glykeron.**

This preparation is just outside the requirements of ℗1 *and therefore outside* ℗ *in Diamorphine base content reckoned on Hydrochloride + H_2O.)*

Dose.—1 drachm (4 Cc.) (= $\frac{1}{16}$ grain of Diacetyl Morphine Hydrochloride) repeated; children of 10 or more years 15 to 30 minims (1 to 2 Cc.) or less. A proprietary article. Is given for coughs, asthma, pneumonia, bronchitis, etc.

Drug Addiction. Heroin is used sometimes by injection and sometimes as a snuff like Cocaine. Supplies here and in U.S. were readily obtainable. It was vaunted as a cure for morphinism. The addict prefers it to Morphine. The Morphine addict has only one or two stools a week, whereas the bowels of the Heroin addict are almost normal. There is not so much pallor or, emaciation. In New York Heroin is used almost entirely.—W. E. Dixon, B.M.J. ii./21,821. See also Absts. under Cocaine, Morphine, Opium, Nicotine.

℞ **Morphine-Methyl Bromide.** *Syn.* MORPHOSAN.

$C_{18}H_{22}NO_3Br.H_2O = 398{\cdot}212.$

Dose hypodermically, $\frac{1}{8}$ to $\frac{1}{4}$ grain (**0·008 to 0·016 Gm.**)

White needles soluble 1 in 20. Comparatively with Morphine it is non-poisonous—it is thought to be 10 times less potent.

Uses.—In epilepsy, also for use with Scopolamine *q.v.* as anæsthetic.

Morphine Methyl Chloride. $B.CH_3Cl.2H_2O = 389{\cdot}782$. It loses one molecule of water at 100° C. and the other at 135—140° C. Soluble 1 in 10 water. It resembles Morphine in its reactions with Ferric Chloride, Nitric Acid, etc., but its solution gives no precipitate with Sodium Carbonate or Ammonia, while its acidified solution gives a bulky crystalline precipitate with Potassium Ferrocyanide, Morphine salts yielding no precipitate.—D. B. Dott, P.J. i./21,232.

℞ **Papaverine.** $C_{20}H_{21}O_4N = 339{\cdot}276$. An alkaloid of Opium (0·5 to 1%). M.pt. 147° C. Easily soluble in hot alcohol, but with difficulty in the cold.

℞ **Papaverine Periodide.** $C_{20}H_{21}O_4N.2I = 593{\cdot}116$. (apparent composition).

Dose.—$\frac{1}{2}$ grain (**0·03 Gm.**) carefully increased if necessary.

When made by interaction of Papaverine and Iodine in suitable solvent (*cf.* Alkaloidal Periodides) the compound is obtained as a dark-red crystalline powder containing 57·1% Papaverine, according to investigations in the author's laboratories (1923).

Solubility.—Slightly soluble in Alcohol, almost insoluble in Chloroform and Ether, insoluble in water.

Pharmacology.—

Doses of $\frac{1}{4}$ and $\frac{1}{2}$ grain were taken by two of the Author's assistants (C.H.B. and J.E.B.). No discomfort caused, and no untoward symptoms observed.

It will be observed in the table on p. 148 that this periodide is relatively resistant to both Physiological Acid and Alkali. It does not, however, necessarily follow that the body is for this reason of little utility in medicine.

Uses.—The introduction of the compound is apt at the present time. Salts of Papaverine have attracted attention recently by their analgesic action. The Periodide, containing 57·1% of the useful alkaloid, in conjunction with 42·9% of Iodine in a labile form, suggests it being of value in gastric and intestinal spasms. It is also worthy of trial in bronchial spasmodic affections.

Dispensing Note.—To be given alone, in cachet or 'slipule,' preferably after food.

Panitrin.

Dose.—One injection a week, with a total of 3 to 8 injections, on different sides. The treatment may be repeated after an interval of one or two months.

Stated to be a solution of Papaverine Nitrite, each ampoule containing 0·05 Gm. To induce a more active capillary circulation in the auditory apparatus in deafness of various types. The functions of the ear, it is claimed, depend to a great extent upon the circulation within its capillaries. Disturbance of such circulation and of the blood-pressure in the ear are of importance. The preparation acts upon the vessels of the auditory apparatus. The injections are made under the periosteum, behind and above the ear, on both sides, even in cases where only one ear is affected. As the injection is painful, precede with a little Novocain.

℞ **Papaverine Sulphate.** $(C_{20}H_{21}O_4N)_2H_2SO_4 = 776{\cdot}628$.

Dose.—$\frac{1}{2}$ to $1\frac{3}{4}$ grains (**0·03 to 0·11 Gm.**) *per os* or hypodermically up to 8 grains (**0·5 Gm.**) in a day.

A white crystalline powder soluble 1 in 2 in water—by expt.—W. H. M. It is said to be non-toxic in single doses of even 1 Gm.

A rather feeble central analgesic and a local anæsthetic. Does not induce a habit like morphine. In all kinds of gastric and intestinal spasms (also for the diagnosis of pyloric spasm); in biliary colic; and in bronchial spasm. Of more doubtful value in pertussis, hyperemesis, and vascular spasm—angina pectoris, acute uræmia, and eclampsia. The local anæsthetic action, with vasodilatation, has been used against rhino-asthma, and to mitigate the pain of irritant injections.—Pal, Jl. American Medical Association.

Papaverine has a Strychnine-like action which is missing in its methochloride and reappears in its reduction product Laudanosine.—F. L. Pyman, L. ii./17 924.

Ureteral Calculus treated by Papaverine. In the case of a man aged 72, after catheterisation and injection of oil had failed 5 Cc. of 2% solution Papaverine Hydrochloride were instilled through a catheter and six days later 5 Cc. of 2% Papaverine Sulphate Solution. Stone was removed from floor of bladder with Young's rongeur. In another case of a man aged 40, ten days after instilling 5 Cc. of the Papaverine Hydrochloride Solution fragment of stone was dislodged and recovered in bladder washings. Papaverine Sulphate Solution was again instilled and the following day the stone was produced in the urine. In a further case of a man 33, withdrawing catheter to a point just above obstruction, 3 Cc. of the Hydrochloride Solution were instilled and the stone was expelled a few days later per urethra. Striking feature in these cases was the absence of renal colic following the use of Papaverine. It is non-toxic in the dosage employed. Both sulphate and hydrochloride were prepared from the alkaloid Papaverine and two per cent. solutions of each made up. No difference was noted in the action of these two solutions; *the sulphate is much more soluble and therefore recommended for use.* The action is unquestionably due to the analgesic properties of the alkaloid and its effect in overcoming spasms of the ureter.—H. A. Fowler, Annals of Surgery (U S.A.) May, 1917.

Combination of Narcotic Drugs.

It has been shown that combinations of Narcotic Drugs may be more potent than would be expected by taking the sum of the two substances, *e.g.*, in the case of Codeine Diethylbarbiturate + Sodium Diethylbarbiturate. In other instances by adding a weak substance to a potent narcotic, marked increase in narcotic power occurs. (The maximum effect, according to Straub, in the case of Morphine + Narcotine only occurs with certain proportions.)

The same exists in the case of the naturally occurring Opium Alkaloids. A mixture of all the alkaloids of Opium has a narcotic effect not only greater than the Morphine in it will account for, but much greater than a summation of the effects of the different alkaloids would lead one to expect.—B.M.J.E. i./13,84.

Morphine Meconate is stated to be 25% stronger than the equivalent dose of Morphine Hydrochloride—due to the action of the Meconic radical.

Burgi's Theory is as follows:—

Drugs having the same physiological action summarise their therapeutic effect when given together, but drugs of different pharmocological action given together increase their activity markedly more than the sum of their action when given separately—they probably act on different cells. Thus Morphine, Codeine, Heroin, and Thebaine give results equal to the sum of their effects, but combined doses of Morphine, Narcotine, and Papaverine are 20 to 50% more toxic than the same doses separately. The word **Synergism** has been adopted to indicate the action of one drug in enhancing the effect of another.

Ⓟ **Codeonal.** *Dose.*—Two 2½ grain Tablets in the evening.

Wholesale and retail vendors must label 'Poison' and treat otherwise as Ⓟ, or indeed it should be regarded as a salt of a vegetable alkaloid, i.e, [P1].—W. H. M.

A combination of Codeine Diethylbarbiturate (2 parts) with Sodium Diethylbarbiturate (15 parts).

It appears that Codeine is the only Opium alkaloid that can form this combination. ***Soluble*** about 1 in 30 of water.

Uses.—Hypnotic, in disease of the nervous system and pulmonary disorders. It takes effect after about half an hour.

[P] [P1] **Morphine Narcotine Meconate.** *Syn.* ★**Narcophin** (T.M.341895.) PATENTS: (Nos. 13293, of 1912, and 3402 of 1913.) The former is paid up for the 7th year; the latter became void in 4th.

Dose.—⅓ to ½ grain (**0·02 to 0·03 Gm.**).

The compound made by dissolving Narcotine, Morphine and Meconic Acid in equimolecular proportions in Alcohol and precipitating with Ether contains slightly more Morphine and Meconic Acid and slightly less Narcotine and Water than required by the formula $C_{17}H_{19}NO_3.C_{22}H_{23}NO_7.C_7H_4O_7.4H_2O$. The slight excess of Acid makes the body easily *soluble* in water. A mixture of the constituents in powder form in molecular proportions is not perfectly soluble. The discrepancies are therapeutically not serious.—D. B. Dott, P.J. i./13,99. On heating a compound of the above formula there is evident evolution of gas at 140° but it does not distinctly melt until 168° is reached.—D. B. Dott, P.J. i./21,232; C.D. Mar. 26, 1921, p. 429.

Narcophine is *soluble* 1 in 5 in water approximately, but not completely, and the solution is not improved by adding more water—on the contrary.—D. B. Bott, *ibid.*

Uses.—Hypnotic. It is similar in action to Morphine and Scopolamine and is used where Morphine is employed, also where Morphine alone is inadmissible (diseases of organs of respiration, etc.).

It is stated that the paralysing action of Morphine on the respiratory centre is lessened greatly by adding an equal quantity of Narcotine. In the case of mice the toxicity of the two together is so small as to be hardly measurable. The most increase in narcotic effect is obtained by using equal weights.

[P] [P1] ★**Spasmalgin** (T.M. 404064).—Combination of Papaverine, Omnopon and Atrinal (a Sulphonic derivative of Atropine). In gastric pain, colic and painful menstruation.—L. ii./20,506.

1.1 Cc. of Spasmalgin Injection or each Tablet corresponds to 0·02 Gm. Papaverine, 0·001 Gm. Atrinal and 0·01 Gm. Omnopon. *Dose.*—One to two tablets a day increased to four in severe cases.

MULLS.

Anserine Mulls. *Martindale.*

These consist of **Medicated Ointments** prepared with a basis of **Goose Grease (Oleum Anseris)** depurated and benzoated, spread on calico Bandages. They are prepared 4 and 7½ inches wide by 1 yard.

It has been shown that goose fat possesses the *highest penetrating power* amongst absorbent ointment bases.

Medicated Anserine Mulls for treatment where rapid and thorough absorption into the tissues is required, are made with:—

Acid Boric 10%
Acid Carbolic 2%
Betanaphthol 5%
Chrysarobin 2%
Ferric Oleate 5%
Ichthyol 10%
Iodine 2%
Mercury 10%
Thiosinamin 5%
Oleum Rusci 5%
Potassium Iodide 10%
Scarlet Red 4%
Sulphur 10%

Adepsine Mulls are bandages similar to the above, but prepared with Benzoated Lard basis. This basis is suitable where deep penetration into the skin is not so essential, *e.g.*, **Adepsine Mulls** :—

Acid Boric 10 and 20%
Acid Carbolic 2 and 4%
Acid Salicylic 5 and 10%
Bismuth Carbonate 20%
Calamine 10%
Cupric Oleate 10%
Liquor Carbonis Det. 10%
Menthol 5%
Resorcin 5%
Thorium Oleate 25%
Zinc Oxide 10%
Zinc Oxide 20%, **Ichthyol** 10%
Zinc Oxide 20%, **Calamine** 5%

Plaster-Mulls of soft rubber adhesive plaster basis, spread on cotton cloth.

No.		
2	Acid Boric ..	40*
4	,, Carbolic ..	15
9	Acid salicyl. ..	50
64	Acid. salicyl. ..	40
	Ext. cannab. ind.	10
76	Ac. salicyl.	20
	Creosote ..	40
6	Chrysarobin ..	15
15	Hydrarg. . ..	55
16	Hydrarg. . ..	55
	Acid. carbol ..	15
17	Hydrarg	30
	Zinc Oxide ..	7½

No.		
(P)	Hydrarg.	30*
	Acid. carbol. ..	15
88	Hydrarg. perchlor	4
	Zinci oxidum ..	15
204	Ichthyol . ..	40
7	Pyrogallol ..	40
231	Thiosinamin ..	40
24	Zinc ox.	45
74	Zinc ox.	35
	Ichthyol . ..	17

Plasters, Rubber, white adhesive, containing a proportion of Zinc Oxide spread on pink cotton. They are 2½, 3¾ and 5 Cm. wide, in spools.

NAPHTHOL.

Beta-Naphthol (*Off.*). U.S., Fr. Cx., **P. Belg.**, **P. Austr.** $C_{10}H_7OH$ = 144·114.

Dose.—3 to 10 grains (**0·2 to 0·6 Gm.**) in cachet or Slipule (No. 00 for 5 grains). Fr. Cx. *Max. single dose* 15 grains ; Max. dose during 24 hours 45 grains approximately.

Manufacture.—

β-Naphthol is prepared by heating Naphthalene (which is obtained by cooling the 180° to 220° C. fractions of the distillation of coal tar) with strong Sulphuric Acid at 170° to 180° C., β-Naphthalene Sulphonic Acid $C_{10}H_7SO_3H$ = 208·174 being formed. This is converted firstly into the Calcium $(C_{10}H_7SO_3)_2Ca$ = 454·422 and then the Sodium Salt, $C_{10}H_7SO_3Na$ = 230·166. By treatment at 300° C. with Sodium Hydroxide this is converted into Sodium Naphtholate, $C_{10}H_7ONa$ = 166·106, which is ultimately decomposed with Hydrochloric Acids forming β-Naphthol and Sodium Chloride.

β-Naphthol has a faint Storax odour ; when sublimed it is in white shining laminar crystals ; ***soluble*** in alcohol 1 in 2, ether 3 in 4, chloroform 1 in 24, and 1 in 24 benzol ; 1 in 12 of olive oil and lard, and 1 in 80 of vaseline. Addition of boric acid increases solubility in water.

Incompatible with Camphor, Ferric Chloride, Menthol, Phenazone and Phenol.

* Percentage of medicament. Note Acid Salicylic is also made 30, 25, 20, 15, 10 and 5%.

Uses.—Internally, in enteric fever; safe and efficient, but sometimes causes too much gastric disturbance. In dilated stomach, dyspepsia and other disorders. In cholera, as preventive, and in treatment of early stages; and used as a vermifuge.

It is a powerful antiseptic and germicide. In advanced scabies, an ointment of 10 to 15% cures the eczema as well as destroys the parasite, but the **Compound Ointment L.H.** (Kaposi's Ointment) is preferred.—Naphthol 15, Lard 100, Green Soap 50, Prepared Chalk 10. Useful also in psoriasis.

β-Naphthol 5, Alcohol 100, Glycerin 10, is a remedy for hyperidrosis of palms, soles, and axillæ.

In kidney disease β-Naphthol is contraindicated. Ankylostomiasis treated by 30 grain doses caused poisoning. Thymol may be safer.—W. B. Orme.—B.M.J. ii./15,176.

Pills and Tablets, β-Naphthol 3 and 5 grains, are prepared.

Tablets of Betanaphthol 5 grains (**0·3 Gm.**) **with Phenolphthalein** 3 grains (**0·2 Gm.**).

To combat ankylostoma infection. A useful combination.

TRACHOMA treated by '**Oxidised Naphthol Camphor.**' The remedy should be freshly prepared, 2 parts of Camphor and 1 of Naphthol warmed gently and filtered, and the mixture allowed to oxidise in a clear glass vessel to syrup consistence and brown mahogany colour. The application is made with a small brush well soaked in the solution and then wiped nearly dry. Four to ten applications suffice.—G. Gerard, Pres. Sept. '20,312.

Betanaphthol 5 grains, Salol 5 grains and Calomel $\frac{1}{6}$ grain combined in capsules valuable in flatulent DYSPEPSIA. A paper on pre-operative treatment of enlarged prostate.—J. W. Thomson Walker, B.M.J. i./21,71.

ANKYLOSTOMIASIS AND MALARIA. 75% of malaria cases in Malay States are also ankylostomiasis cases. It may be that the ankylostoma worm is as much responsible for malaria as the mosquito. Quinine cannot be given in large or continuous doses. Best results with Betanaphthol and Ol. Chenopodii.—D. Bridges, B.M.J. ii./21,149.

Beta-naphthol, 15 grains for ten days, on an empty stomach, after male fern had eliminated everything except the head—effectual in tænia.—J. W. Tomb, L. i./23,1131.

ASCARIS infection treated with Betanaphthol showed microscopic cure of 69·8% after first treatment and 31·2% after second—though none of the stools examined showed ascaris.—C. N. Leach and G. E. Hampton, per Jl. Trop. Med., May 1/23,145.

Charbon Naphtholé. *Dose.*—60 to 120 grains. A granular preparation of wood charcoal, containing 5% β-naphthol, for use in ailments of the stomach and intestines.—Ph. Notes. Greece.

Ph. Ital. IV. gives:—Beta Naphthol 3, Charcoal 3, Magnesium Oxide 3, prepared with Alcohol 95%, 5.

α-Naphthol $C_{10}H_7.OH$ = 144·114 is said to have greater antiseptic power, but given internally causes more irritation.

Manufacture.—This is also made from Naphthalene on similar lines. The tip' is that the sulphonation must be conducted at a *very low* temperature.

A solution of 1 in 3,500 of water is used to wash out the intestines by rectal injection.

Dose.—2 to 5 grains (**0·12 to 0·3 Gm.**) but larger doses are given.

Benzonaphthol.—*Syn.* **Benzoyl-Naphthol.** Beta-Naphthol Benzoate. FR. CX. $C_{10}H_7OOC:C_6H_5$ = 248·181.

Dose.—4 to 10 grains (**0·25 to 0·6 Gm.**) in cachet or suspended in mixture.

Manufacture.—Add Benzoyl Chloride 140 to finely powdered β-naphthol 144. Then heat to 125° C. ½ hour and pour the liquid into equal volume of water. Filter off and recrystallise (*twice*) from Alcohol, and wash with water.—M.Pt. 110° C.

A white crystalline powder. Soluble in alcohol and chloroform, almost insoluble in water. An intestinal antiseptic and diuretic, *e.g.*, in typhoid. May be combined with bismuth salicylate. Externally is used 3 to 10% in ointments. **Tablets**, 5 grains, to be crushed and taken in a little water.

Betol. *Syn.* **Naphthalol, Betanaphthol Salicylate.** Fr. Cx.

$C_6H_4OH.CO.OC_{10}H_7 = 264{\cdot}181.$

Dose.—3 to 8 grains (**0·2 to 0·5 Gm.**) in cachets or pills, or suspended in almond emulsion or milk.

Manufacture. — It is generally directed to heat Sodium Salicylate and *B*-Naphthol-Sodium with Phosphorus Oxychloride on the lines of making Salol. The following is the reaction :—

$$2C_6H_4OH.COONa + 2C_{10}H_7ONa + POCl_3 = 2C_6H_4OH.COOC_{10}H_7 + 3NaCl + NaPO_3$$

The compound is washed and recrystallised from Alcohol.

We did not find this method satisfactory. It is better to use Beta Naphthol and Sodium Salicylate : the yield however is poor —only about 60% of theory.

The quantities employed are Beta Naphthol 144, Sodium Salicylate 168, and Phosphorus Oxychloride 80. The Beta Naphthol and Sodium Salicylate are intimately mixed and the Phosphorus Oxychloride added with trituration. When solid the mixture is transferred to a flask and heated until Hydrochloric Acid ceases to be evolved. Recrystallise from spirit. Melting point 95° C.

The equation is :—

$$2C_{10}H_7OH + 2C_6H_4OH.COONa + POCl_3 = 2C_6H_4OH.COOC_{10}H_7 + NaPO_3 + NaCl + 2HCl$$

The substance is not soluble to any extent in Sodium Hydrate solution which is remarkable as it contains a Phenolic Hydroxyl group.

In small tasteless white crystals, insoluble in water, soluble in alcohol. Useful in rheumatism, cystitis, and intestinal catarrh.

Cachets of Betol and Bismuth Salicylate, 5 grains each, useful as an intestinal disinfectant. Contra-indicated in renal disease.

Naphthalene. $C_{10}H_8 = 128{\cdot}114.$

Dose.—2 to 15 grains (**0·12 to 1 Gm.**) in cachets.

A hydrocarbon formed in the manufacture of coal gas. In white crystalline plates (M.pt. 80° C.) with persistent odour.

Soluble in Ether 1 in 3, in Alcohol 1 in 25, in Olive Oil 1 in 8, in Chloroform 1 in 1½, insoluble in water. May be given in Malt Extract.

Uses.—As an intestinal disinfectant for the diarrhœa of consumption, and of typhoid and for dysentery. 8-grain enemata are useful. Is painless in action, and promotes healing of ulcers. Internally with success to lessen fœtor of urine and stools. A vermifuge in tænia and ascarides. Suppository and ointment (10%) are used for pruritus ani. A 10 to 20% solution in oil is successful as a parasiticide in scabies. The vapour is inhaled for whooping cough.

Seven doses (1·75 Gm. in all) of Naphthalene taken as anthelmintic in the case of a child six years old caused death.—P.J. ii./11,407.

Moulded into blocks or sticks, it is sold as ✱Alabastrine (T.M. 82510 and 87476 Class 2), ✱Camphylene (T.M. 78560 Class 2) and Albo-carbon (' Carbon ' in Lamp trade).

Pilula Naphthalini, 3 grains.

A **Precipitated Form** is also made by adding an alcoholic solution to water. For use as a dusting powder diluted 1 in 10.

Mosquitos in wells, etc., can be destroyed by Napthhalene.—B.M.J. ii./14.15

N.C.I.—Naphthalene of commerce with 2% Creosote and 2% Iodoform. Used to dust the clothes in the war as a vermicide. Must not be used too freely especially at the fork, as it may smart. Useful in conjunction wtih Vermijelli.—A. D. Peacock, B.M.J. i./16, 784.

A cheap inert powder might replace the Iodoform, thus Naphthalene 96. Creosote 2, French Chalk 2.—J. P. Kinloch, B.M.J. i./16,790.

Undervests of butter muslin dipped in a solution of 1% each Naphthalene and Sulphur in benzol or petrol effectual in preventing pediculosis.—J. A. Gunn, B.M.J. i./17,579.

Naphthalene Tetrachloride.—*Syn.* NAPHTHALIN HYDROCHLORIDE, $C_{10}H_8Cl_4 = 269{\cdot}954$. *Dose.*—3 to 12 grains (**0·2 to 0·8 Gm.**), in cachets or pills.

Manufacture.—Mix well powdered Naphthalene 400 and Potassium Chlorate 800 and dust into concentrated commercial Hydrochloric Acid in an *open* vessel (chlorine is given off) with care. Allow to stand for several hours. Drain off the liquor from the yellow mass and wash with water. Warm with alcohol to about 80° C. and filter, rejecting the liquor. The residue is again extracted with alcohol until it is white; everything dissolves except the Naphthalene Tetrachloride. Recrystallise from Chloroform.

White crystals, melting at 182° C., insoluble in water.

Has been used in cases of bacterial intoxication such as colitis with improvement. It is doubtful whether the substance acts as an antiseptic after leaving the stomach. It was tried in 8 grain doses in cachets every 4 hours (night as well).—J. Langford Moore, St. Barts. Hosp. Jan. 1910.

Formagules of Naphthalene Tetrachloride 5 grains in each, are made.

ℙ NARCOTINA.

Syn. ANARCOTINE. $C_{19}H_{14}(O.CH_3)_3NO_4 = 413{\cdot}302$.

Dose.—1 to 3 grains (**0·06 to 0·2 Gm.**) or more in a pill.

An alkaloid from opium (sometimes as much as 15% of), in white crystals, insoluble in water, soluble 1 in 3 of chloroform, 1 in 100 of 90% alcohol, 1 in 125 of ether, soluble also in benzol. An antiperiodic of great power,—analogous to, if not identical with, Quinine. Of signal use in malaria. Has been suggested for use in sleeping sickness. Dose as above. *cf.* also Morphine Combination.

Synthesis of, —*vide* Perkin and Robinson.—Proc. Chem. Soc. 26 (1910), 46 and 131.

ℙ **Cotarnine Hydrochloride.** *Syn.* ✱**Stypticin** (T.M. 216872). $C_{12}H_{15}NO_4HCl = 255{\cdot}640$.

Dose.—$\frac{1}{4}$ to $\frac{1}{2}$ grain (**0·016 to 0·03 Gm.**) internally or hypodermically, in special cases up to 4 grains in 10% solution.

The salt of the base ℙ Cotarnine $C_{12}H_{15}NO_4 = 237{\cdot}188$, obtained by oxidising narcotine with manganese dioxide and sulphuric acid,

in primrose-coloured granular crystals, very soluble in water and alcohol. It was placed on the market by a British firm long before the Germans boomed it under the fancy name.—F. A. Hocking, C.D. Mar. 10/17. M.pt. 125° C. (Dott). Is allied to Hydrastinine (*q.v.*). In all forms of uterine hæmorrhage, useful in checking profuse menstruation. 1 to 2% may be used on a tampon.

Erysipelas, eczema and shingles may be treated with a 5% ointment.

℗ **Tablets of Cotarnine Hydrochloride, ¾ grain (0·05 Gm.).**

℗ Ointment 2% with Unguentum Lanolini, in herpes and ulcerative balanitis. In more acute similar complaints up to 10% strength.

℗ **Stypticin Wool,** 30% and ℗ **Gauze** are made.

℗ **Urethral Bougies of Cotarnine** in cacao butter or gelatin contain ½ grain (**0·03 Gm.**), four inches long, and ⅛ inch in diameter, are used to check bleeding caused by sounds or catheters

ℙ1 **Cotarnine Phthalate.** ✱Styptol (T.M. 253307).

$(C_{12}H_{15}NO_4)_2.C_6H_4COOH.COOH = 640{\cdot}465.$

Dose.—¾ grain (**0·05 Gm.**), but much larger doses are given by some practitioners, *e.g.*, 10 grains without unpleasant effects, every 2 to 3 hours. Five grain doses suitable for mild cases.—George Foy.

An orange red body soluble in water. Contains 73% Cotarnine.

℗ **Styptol Tablets ¾ grain (0·05 Gm.).**

Myristicin, the constituent of nutmeg, dill, and parsley oils, can be used as a starting-point for the synthesis of the base Cotarnine, and thence to produce styptol and stypticin.—Zeit. f. Angew, Chem , 1911,40. *Cf.* Hydrastinine, *Vol. II.*

NEBULÆ.

These are solutions for application to the throat and nose by the aid of a fine spray apparatus or atomiser. By means of a glass, metal or vulcanite tube, a jet of fine spray may be directed into the pharynx or nares, and if a deep breath be taken at the proper moment some of the spray will enter the larynx. The patient must be taught to carry this out personally. Nebulæ are aqueous, or of Liquid Paraffin, Almond Oil or Olive Oil. The following indications may prove useful :—

Antiseptic, Healing and Demulcent.—**Nebula Alkalina, Nebula Mucin,** *q.v.*

Antiseptic and Soothing.—(*a*) **Nebula Acidi Borici**—Glycerin of Boric Acid 1 drachm to the ounce ; (*b*) **Nebula Potassii Permanganatis,** *q.v.* ; (*c*) **Nebula Acidi Tannici**—Glycerin of Tannic Acid 40 minims, Rose Water to 1 ounce.

Analgesic.—℈ ℙ1 **Nebula Cocainæ Oleosa,** *vel* **Aquosa** *q.v.*

Asthma.—(*a*) **Nebula Anti-asthmatica "Compound Asthma Fluid"** *q.v.* and (*b*) ℗ **Nebula Lobeliæ Composita**—Lobelia Tincture, Belladonna Tincture, Stramonium Tincture, of each 10 minims, Ipecacuanha Tincture 5 minims, Pyridine 1 minim, Sodium Nitrite 10 grains, Glycerin and Rose Water to 1 ounce. (The pyridine is rather objectionable in taste.)

Astringent.—(*a*) Ⓟ **Nebulæ Zinci Chloridi,** 10 to 25 grains, with Rose Water 1 ounce; (*b*) **Cupri Sulphatis,** 5 grains to the ounce; (*c*) **Ferri Perchloridi,** *q.v.*, **Hydrargyri Nitratis** (*q.v.*).

Diphtheria.—To dissolve membrane, **Nebula Acidi Lactici,** *q.v.*

Catarrh, Nasal, and congestive state of the Eustachian tubes.—Ⓑ ℙ1 **Nebula Cocainæ Composita**—Cocaine 2 grains, Cinnamon Oil 5 minims, Menthol 15 grains, Liquid Paraffin to 1 ounce. **Nebula Resorcini** 1%. **Nebula Antipyrini** 3%.

Catarrh, Dry.—(*a*) **Nebula Eucalypti**—Eucalyptus Oil 20 minims, Liquid Paraffin to 1 ounce; and (*b*) **Nebula Eucalypti Composita**; (*c*) **Nebula Mucin,** *q.v.*

Hay Fever.—(*a*) **Nebula Suprarenalis Extracti,** 5% and 10%; (*b*) **Nebula Quininæ Antiseptica**—Quinine Hydrochloride 30 grains, Carbolic Acid 8 grains, Glycerin and Rose Water to 1 ounce.

Phthisis.—(*a*) **Nebula Creosoti Composita**—Creosote 5 minims, Cassia Oil 5 minims, Almond Oil to 1 ounce; (*b*) **Nebula Iodi Composita**—Iodine 2 grains, Carbolic Acid 8 grains, Menthol 5 grains, Camphor 2 grains, Liquid Paraffin to 1 ounce. 2% Creosote may be added (if made with Almond Oil).

Stimulant.—(*b*) **Nebula Mentholis,** *q.v.*; (*b*) **Nebula Mentholis Composita**—Menthol and Camphor, 20 grains each, Cinnamon Oil 5 minims, Liquid Paraffin to 1 ounce; (*c*) **Nebula Potassii Chloratis cum Ferro, L.H.**—Potassium Chlorate 15 grains, Solution of Ferric Chloride 20 minims, Glycerin 1 drachm, Water to 1 ounce. (*d*) **Nebula Chlorbutolis Composita St. Th. H.**—Chlorbutol 15 grains, Camphor 40 grains, Menthol 40 grains, Cinnamon Oil 8 minims, Liquid Paraffin to 3 ounces.

For a common cold where *B. Septus* is the principal cause of infection, as spray and gargle Potassium Chlorate 10 grains, Solution of Ferric Chloride 15 minims, Glycerin 30 minims, and Water to 1 ounce, are useful. This is said to be of little value after 24 hours, when give a Potassium Chlorate gargle.

Tonic.—(*a*) **Nebula Pini Composita,** containing Pine Oil, Eucalyptus Oil, Cassia Oil, of each 5 minims, Menthol 5 grains in Almond Oil 1 ounce; also (*b*) Ⓑ ℙ1 the same, with Cocaine 1%.

For further formulæ, consult Index.

Intratracheal medication with a bent glass tube containing medicated oil. —A. R. Friel, B.M.J. i./22,149.

NITROGLYCERINUM, P. Jap.

$C_3H_5(O.NO_2)_3 = 227{\cdot}079.$

Syn. Trinitroglycerin; Glonoin; Trinitrin; Glyceryl Trinitras.

Dose.—$\frac{1}{200}$ to $\frac{1}{50}$ grain (**0·0003 to 0·0013 Gm.**) increased to $\frac{1}{10}$ grain.

Manufactured by adding Glycerin to Nitric and Sulphuric Acid mixed. A mixture of 3 parts by weight Nitric Acid Sp. Gr. 1·3 and 5 parts by weight of Sulphuric Acid Sp. Gr. 1·842 is used, and to nitrate 1 part by weight glycerin is added to 8 parts by weight of the mixture. By using Nordhausen Acid a yield of 230 per cent. of Nitroglycerin is obtainable.—Chem. News, Feb. 14, '08,74. See also P.J. i./09,160.

Alternatively the nitration is conducted with a mixture of Nitric Acid and 'Oleum' (*q.v.*)—this is almost anhydrous, but contains no free Sulphuric Anhydride. The use of Oleum is not essential but a matter of convenience. The following are in use :—

HNO_3	40	46·5	41·5
H_2SO_4	58·4	52·5	58·0
H_2O	1·6	1·4	0·5

About 6 parts of mixed acid are used to 1 part of Glycerin. In this country the nitration must be conducted at not exceeding 22°C.

The nitrators used are the older type of Nobel and more particularly the Nitrator Separator of Thomson, Nathan & Rintoul.—See J.C.S.I., 1908, p. 193. In this latter invention there are no cocks, hence reduction of danger and the Nitro-glycerin is removed from the acid mixture as soon as separated.—Explosives : E. de Barry Barnett, 1919.

A useful account of manufacture of Nitroglycerin. The finished and washed Nitroglycerin is mixed with Siliceous Earth, *e.g.* Kieselguhr. This earth is used for its absorbent power in making Dynamite.—Alfred Nobel's discovery in 1866. Guncotton is made by mixing with cotton waste from the Lancashire spinning sheds. Other mixtures are known as **Gelignite** (containing 56·5%), **Samsonite**, **Saxonite** and **Carbonite** (25% with Potassium Nitrate 30, Barium Nitrate 4, Wood Meal 40, and Sodium Carbonate 1%).—R. R. Pirrie Pr., Feb. 1912,259.

Cordite—Stated to have composition Nitroglycerin 30, Nitrocellulose 65, Soft Paraffin 5. Method of making.—Na. July 28, 1910, p. 109. Eaten by soldiers, produces headache.

Nitroglycerin is a dense, opaque, white, oily liquid, transparent when dehydrated, and of Sp. Gr. 1·600. It has no odour, is slightly volatile, and has a sweet, aromatic, and pungent taste. It is slightly soluble in water, P. Jap. III. says 1 in 800, freely soluble in ether, 1 in 6 of almond oil, freely soluble in absolute alcohol, and 1 in 15 of 90% alcohol. Nitroglycerin in fatty or oily solution is perfectly safe and stable, but in Alcoholic Solution the substance must be handled with the utmost caution.—*Vide infra.*

Uses.—Especially valuable in angina pectoris and generally to relieve dyspnœa of cardiac, pulmonary, or renal origin.

Nitroglycerin, in two minutes after taking a dose accelerates the pulse, relaxes the arteries, produces a feeling of fulness all over the body, but particularly in the head by a throbbing at the sides of the temples. It also causes headache, which lasts from 15 minutes to several hours, according to the quantity taken ; but to patients accustomed to its use the headache is not felt. In treating angina pectoris, neuralgia, asthma, headache, sea-sickness, and Bright's disease, its action is like that of amyl nitrite and the other nitrites, but its effects last much longer. For the weak heart of fatty degeneration and of old persons, this lessened tension proves valuable.

Physiologically it belongs to the class of nitrites—probably, therefore, sodium nitrite is formed directly it gets into the blood.

Notwithstanding the effect on the vascular system by 1/1600 grain of Nitroglycerin (D. J. Leech) or a fraction of a minim of Amyl Nitrite, even large quantities of the medicinal preparations do not readily cause death.—R. R. Pirrie, Pr. Feb. 1912,259.

It is absorbed into the blood practically unchanged, hence its powerful and prolonged action (Brunton)—ex Pharmacol.

Physiological action of Nitroglycerin and the Nitrites. Formation of Sodium Nitrite in the blood (Matthew Hay). Gamgee's work on Methæmoglobin production. Observations of Haldane, Maghill an

Mavrogordato on conversion of hæmoglobin into a mixture of Methæmoglobin and Nitric-Oxide-Hæmoglobin under the influence of Nitrites. Murrell's work on the effects of Nitroglycerin on the lower animals.—R. R. Pirrie, Pr. Feb. 1912,259.

Pharmacological action of Nitric Esters. These bodies act mainly on unstriped muscle fibre and especially on that of the arterioles. The esters of the Monohydric Alcohols (Methyl, Ethyl, etc.) are relatively weak. Methyl Nitrate, for example, injected intravenously is more than ten times weaker than Nitroglycerin, and when given by the stomach more than 100 times weaker. The presence of OH groups (in the higher series) diminishes action as compared with the fully nitrated esters.—C. R. Marshall, B.M.J. ii./12,644.

Strychnine, Ergot and Belladonna are recommended to counteract the headache produced by large doses.

For further notes on treatment see References p. 573.

Injectio Nitroglycerini Hypodermica.

Dose.—1 to 4 minims (**0·05 to 0·25 Cc.**).

Nitroglycerin Solution 5, Alcohol (90%) 2, Distilled Water to 12. Contains about $\frac{1}{240}$ grain in 1 minim. Acts promptly; useful in collapse, &c., when the patient cannot swallow.

Tablets, Hypodermic, $\frac{1}{250}$ and $\frac{1}{100}$ grain.

Liquor Nitroglycerini, 1%. *Made official as*

Liquor Trinitrini (*Off.* and B.P. 1898). **F.E., P. Jap. III.** (now omitted), **P. Hung.**

Dose.—$\frac{1}{2}$ to 2 minims (**0·03 to 0·12 Cc.**) gradually increased to 10 minims, if necessary, every 3 or 4 hours, in any aqueous vehicle.

Trinitroglycerin 1 part by weight, Alcohol (90%) *q.s.* to 100.

Dissolve. Sp. Gr. 0·840. 110 minims contain 1 grain. A colourless neutral liquid; 10 Cc. with an equal volume of water keeps clear, but the further admixture of 1 Cc. of water causes opacity (presence of full proportion of Glyceryl trinitrate). Diluted further, the latter separates in oily drops, which explode when struck with a hammer. Should be kept from sunlight. A 5% and a 10% solution in absolute alcohol are also prepared commercially but are not safe for use in dispensing. (**Spiritus Glycerylis Nitratis, U.S.**, has 1% by weight.) **U.S.** cautions that violent headache may be caused when freely applied to the skin. A little caustic potash solution should be poured over it to decompose should it be accidentally spilled.

For the Assay of Nitroglycerin in Solutions, etc., see Vol. II.

Incompatibility.—Nitroglycerin is decomposed by caustic alkalis. The alcoholic solution is also precipitated by water in excess.

Haustus Nitroglycerini (No. 1.) Vic. Park. *Dose.*—$\frac{1}{2}$ to 1 ounce.

Solution of Trinitrin 1 minim, Compound Chloroform Tincture 10 minims, Pimento Water to $\frac{1}{2}$ ounce.

In asthma $\frac{1}{2}$ to 1 minim doses with Spiritus Ætheris Nitrosi 20 minims every hour for 3 doses useful.—Haviland Hall, Tilley.

Haustus Nitroglycerini (No. 2).

Nitroglycerin Solution 1 minim, Sodium Bicarbonate 10 grains, Compound Tincture of Cardamoms 1 drachm, Spirit of Chloroform 20 minims, Water to 1½ ounces. To be slowly sipped at first symptoms of an attack as restorative in angina pectoris.—Pr. Dec. '10, 863—modified.

Oleum Nitroglycerini, 1% in almond oil.

Dose.—1 to 2 drops or more on sugar. Recommended as being more stable than the alcoholic solution.

Capsules (gelatin) of Nitroglycerin.

Dose.—1 or 2. Contain $\frac{1}{100}$ grain, or more or less as prescribed.

Tabellæ Nitroglycerini, B.P. 1885. *Dose.*—1 or 2.

Introduced by the late William Martindale in 1878, $\frac{1}{100}$ grain in each. These tablets have the nitroglycerin in solution in chocolate, 2½ grains, in a perfectly safe and inexplosive, stable and non-volatile, portable and palatable form. The small bulk, precise dose, and quick action, if well masticated and swallowed, render this mode preferable for administering nitroglycerin.

Additional Strengths of Tabellæ.

The tablets are also prepared containing $\frac{1}{75}$, $\frac{1}{50}$, and $\frac{1}{25}$ grain, and 1 milligramme respectively, for those accustomed to their use, as well as $\frac{1}{200}$, $\frac{1}{400}$, and $\frac{1}{600}$ grain in each, for administration to ladies, delicate persons and children, for whom this is a sufficient dose to ward off sea-sickness. The tablets appear to be non-poisonous even to children; a surgeon records that on one occasion two children, one three and the other six years of age, ate between them straight away two dozen, $\frac{1}{100}$ grain in each, without any injurious effects.

An employé in the author's laboratory (1905) ate a piece of the nitroglycerin mass weighing about 2 ounces, mistaking it for ordinary chocolate. A bad headache supervened, necessitating his lying down, but he was at work again the following day.

Single doses of 5 grains and *daily dose* of 20 minims of Pure Nitroglycerin tolerated.—B.M.J.E. ii./05,52.

Uses of Nitroglycerin Tablets.—One tablet every three or four hours to relieve or ward off attacks of angina pectoris, asthma, sea-sickness, neuralgia, headache, epilepsy, and may be tried for Bright's disease and dysmenorrhœa. In tinnitus aurium has been found useful. A dose of any preparation of nitroglycerin acts more promptly if taken on an empty stomach. In arterio-sclerosis patients are made more comfortable by small doses for a week or two.

In sea-sickness there is a cramp of the vessels and anæmia of the central nervous system. The tablets are of benefit—symptoms quickly alleviated. Repeated doses can be given with perfect safety.

Men on our own battleships find them of service 'through the bay.'

In asthma, of immense value during a paroxysm, but it must not be forgotten the spasm may be of a compensatory nature and of value to the patient.—B.M.J. ii./11,793.

Should be carried about in the pocket to be taken immediately any

pain comes on in the chest. These not only relieve pain but lessen the dangerous condition of which the pain is a symptom.—B.M.J.ii./09,66.

Tabellæ Trinitrini, Trinitrin Tablets (*Off.*).

Tablets of chocolate, each weighing 5 grains (**0·3 Gm.**), and containing $\frac{1}{130}$ grain (**0·0005 Gm.**). B.P. '98, contained $\frac{1}{100}$ grain.

These tablets are double the weight of those in B.P. 1885, and as first manufactured by W. M. This dilution would appear to be unnecessary. *Dose.*—1 or 2, *vide* Tabellæ Nitroglycerini, *ante.*

Tabellæ Nitroglycerini et Caffeinæ.

Dose.—1 every 4 hours or as required—each containing $\frac{1}{100}$ grain Nitroglycerin and 1 grain Caffeine; for use in migraine.

℗ **Tablettæ Nitroglycerini et Sodii Iodidi cum Arsenio.** *Dose.*—1 in every four hours. Each equivalent to Nitroglycerin $\frac{1}{50}$ grain, Sodium Iodide 15 grains, with Fowler's Arsenical Solution 2 minims. This dosage may be considered a routine treatment of aortic disease. The quantity of Nitroglycerin employed is frequently too low, but the above may be given with perfect safety.

℗ **Tabellæ Nitroglycerini** $\frac{1}{150}$ grain (**0·0004 Gm.**) **et Strychninæ** $\frac{1}{25}$ grain (**0·0025 Gm.**).

Also { Nitroglycerin $\frac{1}{120}$, $\frac{1}{100}$, $\frac{1}{100}$ grain with
Strychnine $\frac{1}{20}$, $\frac{1}{50}$, $\frac{1}{100}$ grain }

In migraine Nitroglycerin, especially if in combination with Strychnine, is of value.—Gowers. It relieves headache almost immediately. Its vasodilator effect lowers blood pressure in the peripheral vessels, and so reduces cerebral and arterial pressure.

In high arterial tension where the heart is beginning to fail and such symptoms as irregularity of pulse, giddiness, shortness of breath, or even œdema of ankles begin to appear, combine cardiac tonics—Strophanthus, Digitalis or Strychnine—with Vasodilators. Rest is of utmost importance.—Brunton.

Tabellæ Nitroglycerini Compositæ, W.H. (Not now in W.H.)

Contain Nitroglycerin $\frac{1}{100}$ grain, Amyl Nitrite $\frac{1}{4}$ grain, Menthol $\frac{1}{50}$ grain, Capsicum $\frac{1}{100}$ grain.

℗ **Tabellæ Anti-Asthmaticæ.** (H.).

Dose.—1 to 4 thrice daily.

Nitroglycerin $\frac{1}{200}$ grain, Sodium Iodide 2 grains, Potassium Bromide 2 grains, Fluidextract of Euphorbia Pilulifera 3 minims, Tincture of Lobelia 4 minims.

Very useful in asthma; the nitroglycerin depresses the peripheral ends of the vagus nerves and stimulates the heart by removing the inhibitory action of the vagus and relieving blood vessels elsewhere.

Tabellæ Digitalini et Nitroglycerini *aa.* $\frac{1}{100}$ gr. are also prepared *v.* Digitalin.

Tabellæ Nitroglycerini 1/100 and 1/200 grain **et Thyroidei Sicci** (Standardised—*Martindale*), $\frac{1}{2}$, $1\frac{1}{2}$ and 3 grains, in chocolate basis, are prepared for employing the combined action of these two remedies.

References to use of Nitroglycerin.

Blood Pressure in Man.—

Maximum pressure at various ages in men, women and children. From 8 to 14 it is about 90 mm., from 15 to 21 it is 100 to 115 or 120, from 21 to 65 from 100 or 125 up to 135 or 150, above 65 it may still be 135 to 150 or up to 200 or higher. In women it is about 10 to 15 mm. lower than in men. In athletic men it may be about 10 to 15 mm. higher than in moderate development. The cases in which low tension, below 100 in men and 80 or 90 in women generally are (1) weakness after some illness, especially in influenza (2) in commencing phthisis, (3) in heavy smokers.

In *lowered pressure* abundant food (animal), meat extracts, tonics as Iron, Arsenic, Malt, Cod Liver Oil, Hypophosphites, Glycerophosphates, and as cardiac tonics, Strychnine, Strophanthus, Digitalis and Caffeine are advised.

In Raised Tension.—High tension, especially in advancing age, though giving rise to sense of power and desire for action both physical and mental, may be a danger signal. It is not only a direct cause of cardiac failure or ruptured vessels, but produces atheroma of the arteries, and thus weakening them renders them liable to break. By detecting the rise in time in middle life, tension may be kept down, changes in the arteries leading to arteriosclerosis and atheroma may be prevented, and life prolonged.

Nicotine is almost the only drug which nearly equals Adrenalin in power of raising blood pressure. Tobacco, tea, and coffee must be prohibited.

Mercurials are beneficial, ½ grain or 1 grain of Calomel, or 3 to 5 grains of blue pill once or twice a week, followed by Saline, Potassium Iodide, in dose of 1 to 10 grains thrice daily useful. The Hippurates, Sodium Benzoate, Sodium Nitrite ½ grain, gradually increased to 4 or 5 grains, as also **Pulvis Sodii Nitritis Compositus**, *q.v.*, all tend to keep pressure down. **Nitroglycerin** and **Erythrol Nitrate** act similarly. A doctor was able to keep himself free from attacks of angina by daily use of Erythrol Nitrate for 3 or 4 years, beginning with ½ grain thrice daily, and gradually increasing it. When the pain is acute, **Amyl Nitrite** is the quickest means of relieving, or a little Chloroform as inhalation.—Sir L. Brunton.

The influence of tobacco smoking as cause of arteriosclerosis is not settled. Clinical writers are disposed to admit Tobacco as at least a predisposing cause, though many deny it.—F. W. Andrewes.

The blood pressure has been found to rise for a few seconds 5 to 7 mm. or more after Nitroglycerin $\frac{1}{400}$ grain, before falling in the case of aged persons. It was thought that cardiac stimulation occurred before vascular dilatation in old vessels.—B.M.J. ii./09,1314.

Myxœdema has been treated with $\frac{1}{50}$ grain doses with purgings. In puerperal eclampsia it is strongly recommended. Lowers blood pressure, and increases amount of urine. In epileptic vertigo, small doses relieve.

Gastric origin of angina. In certain favouring circumstances, tension of the gastric atmosphere is associated with painful attacks indistinguishable from those of angina pectoris. A case of flatulent dyspepsia developed seizures of a painful kind—in the upper intercostal nerves including the costo-humeral branch. Nitroglycerin effective—seizures always subsiding immediately.—B.M.J. i./11,613.

To reduce the vascular-tension in cirrhosis of the kidney.—Tirard, Med. Treatment.

Morphine craving relieved.—L. i./09,1334.

In *locomotor ataxia* may be given for long period, in increasing doses, relieving the crisis and lessening the pain.—B.M.J. ii./07,1823.

Gallstone colic quickly relieved by tablets.—L. i./96,353.

Paroxysmal tachycardia : it is *the* treatment.—B.M.J. ii./04,109.

Gangrene of the hand, severe case, successfully treated. Of great value in all cases of impaired circulation. B.M.J. i./05,16.

In *mental disease*. In certain cases depending on cerebral anæmia from vaso-constriction produced rapid cure.—M.A., 1908,37.

In *hæmoptysis* more lasting in effect than amyl nitrite.—L. i./08,565.

Subacute neuritis, a case of, with general dropsy. Nitroglycerin in small doses increased the quantity of urine, and the dropsy disappeared completely in ten days.—B.M.J. ii./08,1670.

In *Carbon Monoxide poisoning* $\frac{1}{100}$ grain injected, together with inhalation of Oxygen advised.—Pr. Dec. '08,842.

In *acute lobar pneumonia* found to aid the action of Digitalis in cases with cardiac weakness—10 minims of Tincture of Digitalis with $\frac{1}{2}$ minim of solution of Nitro-glycerin every three or four hours. Especially indicated when the renal secretion is scanty, and the urine contains more than the usual trace of albumin.—Yeo.

In *chorea*, Nitroglycerin may be given in full doses, and, if necessary, Morphine.—N.Y. Med. Times, Aug. 1911, per Pres. Nov. 1911, p. 284.

A female *æt.* 47, melancholic in nature, for two years had an attack of hemiplegia, evidently hæmorrhagic, blood pressure rose to 170—180 mm. This was successfully reduced to 110—120 mm. by purging daily, and by Nitroglycerin and suitable feeding. Mental symptoms disappeared.—B.M.J. ii./11,1472.

Sleeplessness, where psychic or somatic excitement is the cause, endeavour to reduce the reflex excitability of the cord or lower arterial tension by Nitroglycerin or Bromides.—B.M.J. ii./13,1209.

Wounds caused by N.G. explosion; of peculiar churned-up and softened nature probably caused by the escape of internal body pressure into the vacuum caused by the explosion.—J. L. Thomas, B.M.J. i./16,89.

Acute tubular nephritis accompanied with dropsy. Nitroglycerin is valuable as in the following :—Trinitrin Solution, 32 minims, Potassium Acetate, 5 drachms, Compound Cardamom Tincture, 4 drachms, water to 8 ounces. Dose.—$\frac{1}{2}$ ounce in water every three hours, until symptoms abate, and then thrice daily. Iron tonics to be given so soon as the urine is albumin-free. —J. T. Maclachlan, B.M.J. ii/23,473.

Raised blood pressure—Iodides, Diuretin, Amyl Nitrite.—Sir R. Douglas Powell, Pr. Nov. 1920.

High blood pressure. Salines, exercise, Sodium Nitrite in 3 or even 5 grain doses, several times daily with a diuretic or diaphoretic. Amyl Nitrite or Nitroglycerin for temporary effect—should not be used too early.—J. Henderson, Glas. Med. Jl. April '23,209, B.M.J.E. i./23,81.

High blood pressure. A Trinitrin tablet, in some cases, helps patient to sleep.—Sir H. Rolleston, L. i./23,521.

Methyl Nitrate which is soluble in water to extent of 1 in 30 at 20°C., is 100 times less powerful than Nitroglycerin when given *per os*, and when given into the blood stream is about 15 times less.

NUTRIMENTA.

For **a classification** *of Foods, a consideration of* **"Amino Acids,"** *the* **Biuret Reaction** *for Albuminoids,* **Yeast Extracts as** *Foods,* **Milk Preservation, Bread** *and* **Flour Standardisation,** *the* **Bleaching of Flour,** *and* **Injurious Admixtures to Flour.**——*See Vol. II.*

The amount of protein or albuminoid food needed daily for the actual physiological want of the body is not more than half that ordinarily consumed by the average man. A diet of low protein value is generally recommended for a healthy man and for those suffering from arteriosclerosis.

Man was not intended to be the carnivorous animal he has become. It is frequently stated also that one should reduce carbohydrate intake.

Waste and Overeating. A good résumé and an excellent tirade against white bread, faked and bleached, on which pigeons mope and die in three weeks.—B.M.J. i./15,214.

Metchnikoff suggested removal of the large bowel as owing to its content of 28 billion bacteria produced daily, he thought it is a source of mischief. *See* also a note under Tuberculosis (Vaccine Chapter).

Experiments on rats showed that a meat diet is prejudicial to powers of reproduction and lactation, suggesting that the increased consumption of animal food in this country may tend to the decrease in birth-rate, and diminished powers of lactation.—B.M.J. i./07,193.

DIETETICS, SYSTEM OF, edited by G. A. Sutherland may be consulted for special diets in various conditions. In tuberculosis, very high feeding often results in arrest of the disease; indiet of gout and rheumatism, Luff repudiates the idea that meat is a poison, and will have nothing to do with purin-free diet. In urinary and renal diseases lime and foods containing lime to be excluded. Preference for Magnesia bases to be given in treatment of oxaluria. Sir P. Manson deals with diet in diseases of hot climates.

Quality of Protein in Nutrition. Importance of biological values of proteins. Pellagra broke out among Armenian refugees in Port Said 1916. On improving diet it stopped. Meat has thrice the value of maize.—R. H. A. Plimmer, L. i./21,947.

Queer foods and 'faddists.'—Leader, Jl. Trop. Med., April 2/23,113. See also Agar, Seaweeds, etc., L. i./05,1524.

Preparations of Meat and Blood.

Meat Extract is the product by extracting fresh meat with boiling water and evaporation. Contains not less than 75%of total solids. It should be practically free from Albumin. The yield from meat is about 3%.

Fluid Meat Extract is identical with above prepared by Liebig's original process, except that it is evaporated at lower temperature and contains not more than 75 and not less than 50% of total solids.

Meat Juice is the fluid portion of muscle fibre obtained by pressure or otherwise and may be concentrated at a temperature below the coagulation point of the soluble proteins. The solids contain not more than 15% Ash, not more than 2·5% NaCl (calculated from total Cl), not less than 12% N., not more than 4 or less than 2% P_2O_5. The nitrogenous substances contain not less than 35% coagulable proteins and not more than 40% meat bases.—Allen, 1914, Vol. VIII., p. 390.

Analysis of Meat Extract and similar preparations.—L.ii./08,1541,

"Some Meat Extracts are fortified by additions of meat fibre, blood, albumin, and other nutritious constituents, but they cannot even now be ranked as true foods, for no one could eat sufficient of them, owing to the small quantity of Proteins present and the large amounts of extractive and mineral matters. The amounts of such meat fibre and albumin that it is possible to add to Meat Extract are relatively small and can make little difference to the food value

of the preparation. The white of one egg contains as much nutritive matter as three tablespoonsful of any of these meat preparations (R. Hutchinson)."—A. R. Tankard, P.J. ii./11,72.

Nutritive effects of Beef Extract. It was found both on man and dog that the addition of beef extracts (commercial and home-made) to the diet led to an increase of body weight. Accompanying this was a retention of a considerable portion of the nitrogen given in the extracts. The extracts caused a reduction in the output of Nitrogen by the fæces,—this no doubt being due to the better digestion and absorption of food of the ordinary diet,—hence the extracts may be accredited with both a direct and indirect nutritive value.—W. H. Thompson, W. Caldwell and T. A. Wallace. The question was raised as to whether the effects were not due to stimuation of gastric secretion.—B.M.J. ii./11,613, *et seq.*

"A meat extract is a preparation (involving the use of heat, usually 70° C. by repeated extraction) of the soluble matters of lean beef: it consists chiefly of the nitrogenous extractives of flesh—creatine, creatinine and other meat basis, the non nitrogenous extractive matters, mineral matters varying quantities (usually small) of true Protein substances (Albumin, Albumoses and Peptone), Gelatin and Water. Creatine and its allies are products of metabolism of protein and possess no food value. Gelatin has no nutritive value and the nutritious constituents of meat extract are therefore confined to the proteins, *i.e.*, the albumins and their immediate products of digestion. By far the larger number of true meat extracts contain at most only traces of proteins."—Tankard, P.J. ii./10,407; ii./11,72. See also P.J. ii./10,430.

✱**Bovril** (T.M. 270031, 58405, 76548, 76549, 76860, 76861, 78304, Class 42, also 60501, Class 3.)

A combination of beef extract and finely powdered beef fibrin and albumen, widely used as a substitute for ordinary beef tea. Bovril was the commercial extract used in the investigation into the "nutritive effects of beef extract" referred to above.

Concentrated Beef-Tea.

A firm jelly, in tins and skins, contains the natural gelatin of the meat, and, diluted, forms a nutritious substitute for true beef-tea.

Meat Juice (Brand's.—T.M. 441825).

A teaspoonful in a wine-glassful of water is a useful pick-me-up. Is prepared by cold process resulting in retention of full activity of juice of the raw beef.

✱**Ferrocarnis** (T.M. 346870).

Dose.—One teaspoonful in water thrice daily with meals.

Described as a flavoured solution of iron in organic combination with concentrated raw meat juice. An Iron Tonic food.

Essence of Beef.

A soft, transparent, amber-coloured jelly, prepared from beef by exhausting with tepid water. It is agreeable to the palate and stomach of a delicate invalid; is useful in allaying obstinate vomiting. It is best taken cold by teaspoonsful. Similar essences are made from **mutton** and **chicken.**

Meat jelly is suitable for ulcerated stomach. Gelatin is a powerful protein sparer, easily digested, and fixes a great deal of acid.

Beef, Chicken, Mutton and Veal Peptones, are also prepared.

Restorative Essence of Beef is made from fresh beef, freed from fat, finely chopped up—1 pound mixed with distilled water 8 ounces; add 5 drops of hydrochloric acid, and 60 grains or less of salt; stir well and allow to macerate for 3 hours; strain. The product has an agreeable taste, and should be taken cold. *Dose.*—A wineglassful or more (Ringer). It is also prepared *Peptonised* by digestion with pepsin at the body temperature.

These are best freshly prepared for the patient, but may be preserved a reasonable time by addition of formalin or chloroform.

'ZOMOTHERAPY'—feeding with fresh meat juice has been found of advantage in tuberculosis. *Daily dose.*—The juice from 300–500 Gm. (10 to 16 ounces approx.) of fresh beef is suitable. Further details in last Edn., p. 565.

Beef and Malt Wine.—Extract of Beef 4 ounces, Extract of Malt 8 ounces, Port Wine 1 gallon (Ph. Form.); or a Meat Juice and Liquid Extract may be used instead of the solid extracts.

A 'Beef and Malt Wine' should contain at least 0·18% of Nitrogen and Phosphorus equivalent to 0.12% of Phosphorus Pentoxide. Of 12 samples none contained these amounts.—B.M.J. i./24,919.

Further wines are mentioned in the Proprietary Medicine Chapter. *Vol. II.*

Peptonised Beef Jelly and **Suppositories** are made—*q.v.*

Meat Juices, Liquor Carnis and others.

Dark, reddish-brown liquids consisting of the expressed juice of meat concentrated at a low temperature *in vacuo*. A teaspoonful is added to 3 tablespoonsful of cold or tepid water, and taken in tablespoonful doses or more for sickness or exhaustion. Hot water coagulates the albumen.

✱**Valentine's Meat Juice** (T.M. 289070, 344462, 344464).

Dose.—½ to 2 drachms, diluted.

Two ounces are said to equal 4 pounds of beef; keeps good in warm climates.

✱**Wyeth's Meat Juice** (T.M. 178094).

Dose.—½ to 1 drachm. It contains the albumins of meat in an active and soluble form and the hæmoglobin is unaltered (bright red colour). Should be mixed only with iced, cold, or luke-warm fluids.

✱**Kreochyle** (T.M. 278509, Class 42).—A concentrated meat juice. The *Lancet* has reported that it contains much Albumen. Stated to be easily digestible and stimulating for invalid children and elderly patients, and to prevent vomiting.

Chondrin—the name is given to the mixture of gelatin and mucoid obtained by boiling cartilage.—Halliburton's Handbook of Physiology. Sir E. Sharpey Schafer (Text of Physiology), gives the following:—

Matrix of Hyaline Cartilage:—The organic basis of the matrix was formerly described as *chondrigen*. Chondrin is obtained by boiling chondrigen, Chondrin gelatinises, on cooling a solution of it made with warm water, but in many respects differs from gelatin.

It is freshly prepared as a transparent jelly—may be sterilised and supplied to patients in sealed containers. Suggested for use in gouty affections of the joints, also for rickets and weakness.

Cartilage grafting for sunken nose.—H. Burrows, B.M.J. ii./22,688.

✱**Kolentos** (T.M. 338908)—*Dose.*—One teaspoonful *t.d.* in half a cup of warm water or other fluid. For children with difficult digestion one teaspoonful divided into 3 or 4 doses in 24 hours. Described as a combination of extract of muscle cartilage with lactalbumen and the salts of milk. It contains no Casein. A cream coloured powder resembling in appearance powdered egg albumen. As a weight increaser and bowel regulator. For insomnia to be taken at bedtime. It is recommended as a natural food tonic, being easily digested by the weakest organs. Of service in colitis and other inflammations of the intestinal tract.

Dried Extracted Beef. This commercial article is available in the form of light-brown conglomerated pieces. It is claimed to be the meat residue obtained after pressing off the fresh juices. The substance has been dried at a temperature of about 170° F. It consists of 75% protein and contains, in addition, about 7% lipins (ether-soluble substances). It can be readily hydrolysed by ordinary acid-pepsin solutions. 1 lb. is equivalent to over 4 lbs. of fresh lean beef, less the juice.

Hæmoglobin. *Dose.*—1 to 2 drachms (**4 to 8 Gm.**).

$C_{606}\ H_{960}\ N_{154}\ Fe\ S_3\ O_{179}$ (?) = 13342·932.

The principal constituent of red blood corpuscles. Is supplied commercially in reddish black powder or of extract consistence or in scale form. May be given according to condition in cachet, capsule, or mixed with wine. It is useful in ordinary secondary anæmia. Hæmoglobin solution gives a characteristic absorption spectrum and contains in organic combination iron equal to about ½%.

Cf. Vol. II. for estimation in the blood and further details. It combines readily with oxygen, forming **Oxyhæmoglobin**, which is the substance known in trade as hæmoglobin.

In the arterial circulation, hæmoglobin is present as oxy-hæmoglobin (brilliant red in colour) the oxygen of which is given up to the tissues in its course, returning de-oxidised (dark-red) to the lungs by the venous system where it is ready to take up fresh oxygen and so continue the process.

Hæmoglobin Capsules. Contain 5 grains (0·3 Gm.).

Elixir Hæmoglobin. *Dose.*—1 drachm (4 Cc.) or more.

Hæmoglobin 10, Water 15, Aromatic Syrup (carefully neutralised), *q.s.* to 100 (approximately 5 grains in 1 drachm). An agreeably flavoured preparation of hæmoglobin as hæmatinic.

Elixir Hæmoglobin cum Lecithin.—*Dose.*—1 to 2 drachms.

As above with 3 grains of Lecithin per drachm added.

Nutrient Powder (Brand's).

On bread and butter or mixed with other food is very palatable—it retains the nutritive value of fresh meat.

∗**Herogen** (T.M. 372251).—*Directions.*—Two teaspoonsful in a breakfast cup of warm milk and water. For children half the amount of Herogen.

Contains the essentials of lean meat, milk, cereals, malted grain, and eggs, combined in suitable proportions and sterilised to form a complete and well-balanced food. A nutrient to the nerves and tissues, and as a general restorative.

Albumin Ovi Siccum, Ph. Ned., P. Jap. III. (now omitted).

Dose.—Ad lib. The molecular weight of albumin has been given as approaching 14,000. Yellowish, transparent, horn-like pieces obtained by evaporating white of egg at not exceeding 50° C. (the fresh white of egg is used as antidote in case of poisoning by mercurial and copper salts). Should be easily soluble in about 10 parts of water, producing a neutral solution. Insoluble in alcohol and ether.

Incompatible with mineral acids, alcohol, mercuric chloride, tannin-containing preparations.

In hyperchlorhydria and in nervous disorders egg albumen is a food which binds and neutralises Hydrochloric Acid.

Albumin Water, for infantile diarrhœa and invalids in general. White of one egg mixed with Sterile Water 8 ounces, Sodium Chloride 5 grains or *q.s.* and a little whisky or brandy added.

Albumin Sanguinis.

Dose.—Ad lib. Made by inspissating blood serum. Brown horn-like scales, not so soluble in water as Egg Albumin.

Milk Preparations.

For Milk Analysis vide Vol. II.

Infant Feeding.

Importance of Breast Feeding.—*Biological Properties of Milk. This was urged by E. Janet Lane-Claypon's L. G. B. Report* (1913, *see also H. K. Walker, L. ii.*/15,115). *'All concerned in the health of infants should aim at obtaining satisfactory breast feeding for all infants during, at any rate, the early weeks of life.*

The Enzymes in fresh human milk are Catalase, Amylase and Peroxidase while cow's milk contains, in addition, Perhydridase. We summarise the action of these and other Enzymes in a Table, see *Vol. II.*

'Upper Milk Feeding' for infants and invalids commends itself for certain reasons. 'Upper Milk' consists of the upper portion of milk that has stood in a cool place until a cream layer has formed. An aluminium dipper (holding 1 ounce) is used for the purpose. By diluting with water, or with water and whole milk, mixtures are obtained containing a high percentage of fat with a normal percentage of proteid. Upper milks are much superior to cream mixtures for feeding—the fat percentages are more uniform and the dilutions do not so readily separate as those employing cream.

Dried Milk.

Manufacture.—By spraying milk in a current of hot air or by heating over revolving cylinders. According to Prof. Delépine, although there is great reduction in the number of bacteria, recontamination by pathogenic bacteria occurs in the handling. Precautions should be taken to prevent this. Hygienically and dietetically dried milk should be good. It is superior to condensed milk in protein and fatty matter.—S. Delépine, L.G.B. Report.

Analysis of one brand showed proteins 28·71%, fat 29·29%, Milk Sugar 35·2%, Mineral Matter 5·2%, Moisture 1·6%.—L. ii./18,210.

Examination of a well known British make in the author's laboratories (20/6/23 *showed* ***26·4%*** ***Fat*** *and* 33·1% *Lactose. An advertised brand showed* 22·8% *Fat and* 44·6% *Lactose. It is advertised as having Lactose added.*

Dried Milk is much used for **Infant Feeding.** The **'Half Cream'** Milk is preferred by some **authorities** for the purpose, as being less rich—indeed a healthy child has been reared on *Dried Separated Milk.* This contains perhaps only 1% fat. Obviously if a child is capable of digesting the *full cream* variety it should have it in preference. *B. Tuberculosis* and all other bacteria are killed in the process of desiccation. For infant feeding and general use are :—

Dried Full-cream Milk (with all its original cream) is reconverted into milk by mixing 2½ ounces (5 heaped tablespoonsful) with 1 pint of hot water. To re-convert

Dried Half-Cream Milk (with half its original cream), employ 2¼ ounces (5 tablespoonsful) to the pint of hot water.

Dried Separated Milk (containing 1% of its original butter fat), employ 2 ounces (4 heaped tablespoonsful) to the pint of hot water.

In Feeding Trials with the Dried 'Full' and 'Half' Cream Milk on infants of the poorest class in London, diarrhœa was practically absent throughout. Roughly 1 of powder to 7 of water is the strength of food to start with.

TABLE OF FEEDS.

The milk in the bottle to be shaken occasionally whilst feeding, as the fat separates. No food to be kept over.	Age of Infant.	Intervals of Day Feeding.	No. of Night Feeds.	Boiling Water.	Dried Milk.
	1 week	2 hourly	2	1 to 1½ ozs.	1 measure (holding about 1 dr. weight)
	2 to 3 weeks	2 ,,	2	2½ ozs.	2 ditto
	4 to 5 weeks	2 ,,	1	3 oz.	2-2½ ,,
	6 to 12 weeks	2½ ,,	1	4 oz.	3-3½ ,,

And so on in about same ratio.

The milk is more easy of digestion,—as seen in the case of infants recovering from acute diarrhœa. These are often unable to take fresh milk even in extreme dilution without recurrence of diarrhœa, yet can digest comparatively concentrated mixtures of dried milk.

Get the child back again on cows' milk gradually. A teaspoonful or less to be added to the Dried Milk at first, and increased.

L.G.B. in support of, for infants. One virtue lies in the fineness and softness of the curd formed by it. The hot roller process of desiccation and the method of spraying into hot air are mentioned—the variety made by the latter method is liable to change in flavour on keeping so far as the full-cream is concerned.—F. J. H. Coutts, L. i./18,509.

For infants, Milk in preference to Patent Foods. If Milk is cooked or pure dried Milk be used, fresh fruit juices or raw meat juice must supplement.—From a lecture on Infantile Scurvy by T. D. Lister.

Disadvantages of Dried Milk in infant feeding. *Rickets common.* Babies often decidedly anæmic.—J. Burnet, Pr. Mar. 1921.

Good standard Dried Milk corresponds to the 3% Standard of the Board of Agriculture and Fisheries. Where pure cow's milk is unavailable Dried Milk is a reliable substitute.—R. J. Blackham, Pr. May, 1921.

Protein balance in infant feeding. Combat of the idea that infants will not thrive on cow's milk unless they are given two or three times as much protein as is contained in woman's milk.—E. Pritchard, L. ii./22,44; see also R. Carter, *ibid* 99.

NATIONAL MILK CONFERENCE, speakers in general in favour of Dried Milk.—L. ii./22,930.

Milk dried by the ***roller process*** has a greater amount of antiscorbutic vitamin than spray-process milk.—E. Mellanby, B.M.J. i./24,895.

Human Milk, Artificial.

New Milk 30, Cream $1\frac{3}{4}$, Milk Sugar $1\frac{1}{8}$, Water 18.

COW'S MILK, MODIFICATION TO BREAST STANDARD. The following formula is given:—Milk (of average quality) 10 ounces, Cream (33%) 1 ounce (or Cream 48%, $\frac{3}{4}$ ounce), Sugar (Milk Sugar at first, but later Milk Sugar, Maltose and Cane Sugar mixed) 1 ounce, Broth 4 ounces, water to 1 pint. The addition of broth has been found good.—E. Pritchard, L. i./22,838.

Humanised Milk.—CAN. FORM

Triturate 100 grains of a mixture of Pancreatin 7, Sodium Bicarbonate 28, and Milk Sugar 965,—with Water 2 ounces and transfer to a bottle containing cows' milk 2 ounces, and cream $\frac{1}{2}$ ounce. Immerse this in water heated to 38° C. for $\frac{1}{4}$ hour. Afterwards bring to the boil.

Human Milk has the average composition:—Fat 3·4%, Milk Sugar 6·4%, Albuminoids 1·7% (Casein and Lactalbumen, *cf.* p. 585), Mineral Matter 0·2%. Notice the difference between the human milk and cows' milk (*Vol. II.*) in the relationship between the albuminoids and the mineral matter.

According to a further investigation, it contains on the average more lactose much less protein, and a greater percentage of substances of unknown nature with little or no Nitrogen in their composition. From beginning of the second month of lactation onwards the composition is:—

Fat 2 to 4%, Lactose 6 to 7·5%, Protein 0·7 to 1·5%.

Cow's Milk:—Fat 2 to 4%, Lactose 3·5 to 5%, Protein 2·5 to 4%.

The unknown substances are important constituents in diet. They are soluble in Alcohol and Ether—they are in greater abundance in human milk during the early periods of lactation. At this time they may be 1%, falling to half the amount from the middle period of lactation. In cow's milk they are about 0·3% from the middle period.—Jl. Biol. Chem., Oct., 13, per B.M.J. ii./13,1499.

National Milk Conference.

Variations in chemical composition of milk. Morning milk of ten cows during a fortnight only reached 3% of fat once, while the evening milk was generally in excess of 4%.—B.M.J. ii./22,820.

If artificial feeding has to be resorted to, healthy cow's milk should first be tried; that known as '**Nursery Milk**' is taken from tuberculin-tested cows and may be more usually relied on from large dairies than ordinary milk supply. As a general rule dilute with equal quantity of water. A grain of **Sodium Citrate** to the ounce will increase digestibility (5 and 10 grain **Tablets** are prepared *q.v.*), Milk Sugar, a drachm to the pint, is also a useful addition. Fresh Milk is better than Pasteurised, but in case of doubt Pasteurisation or the use of **Dried Milk** (*q.v.*) or Condensed Milk (containing not less than 13% fat) should be considered. Of the last mentioned use 1 teaspoonful of the sweetened variety to 3 ounces of water, adding 1 teaspoonful of cream. (Condensed Milk should not be given after the child is 4 months old.)

Graded Milk *is dealt with in Vol. II.*

The action of Sodium Citrate in preventing milk clotting has not been thoroughly explained.

Sodium Citrated-Milk (2 grains to the ounce) makes whole milk feeding possible and removes necessity of diluting. Results equal to natural milk. —C. W. Vining, B.M.J. ii./15,457; see also R. D. Rudolph, *ibid*, p. 660.—Strongly in favour of undiluted milk heated in a jacketed pan for 40 minutes as advised by Budin, with addition of Sodium Citrate.

If none of the above are digested, **Peptonised Milk** must be given employing **Peptonising Powders** or **Liquor Pancreaticus** (*q.v.*). **After the child is six months old** a Malted Food may be given as a supplementary food, *but farinaceous foods of all kinds should be discouraged until the child has teeth.*—R. Hutchinson.

Infants' Food 'A' for children up to three months contains all the Milk Solids prepared with antiseptic precautions. Three to five heaped tablespoonsful to be added to a pint of water which has been brought to the boil (and kept boiling for fifteen minutes), and allowed to cool down slightly in a covered jug. When mixed for use, this is practically identical in composition with human milk.

FOOD TIME TABLE.

Age of Child.	1 week.	2 to 3 weeks.	4 to 5 weeks.	6 to 12 weeks.	3 to 5 months.
To be fed during the day every	2 hours	2 hours	2 hours	2½ hours	3 hours
During the night	Twice	Twice	Once	Once	Once
Quantity of "A" Food to use for each meal (the amounts may be increased somewhat if digested).	1 to 1½ full-sized teaspoons	1½ to 3 full-sized teaspoons	2½ to 3½ full-sized teaspoons	3 to 4 full-sized teaspoons	4 to 5½ full-sized teaspoons
Quantity of Water for each meal	2 to 3 tablespoons (1 to 1½ ozs.)	3 to 6 tablespoons (1½ to 3 ozs.)	5 to 7 tablespoons (2½ to 3½ ozs.)	6 to 8 tablespoons (3 to 4 ozs.)	8 to 12 tablespoons (4 to 6 ozs.)

For bacteriological reasons and owing to the fact that the milk fat will rise to the surface on allowing to stand for a few hours, a sufficient quantity only for use at the time is to be prepared in order that the Food may be as fresh as possible at the time of administration.

Food 'B' for Infants (from three to six months) **and Invalids** contains the milk solids with a small proportion of cereal carbohydrates treated to render them assimilable. Prepared for use as the latter.

Food 'C' for Infants (from six months and upwards) **and Invalids** similar to 'B' with a larger proportion of farinaceous constituent. Five heaped tablespoonsful to be used to the pint of water as above.

Cocoa Food is also prepared.

Biscuit Foods.

Biscuit Powder 1½ lbs., Baked Wheat Flour 1 lb., Finest Ground Oatmeal 6 ozs., Milk Sugar 6 ozs., Powdered Malt 8 ozs., dried at a low temperature and mixed.

A better way is to bake into a biscuit the mixture of wheat flour, fine oatmeal and milk, then grind up and mix with the powdered malt.

Another formula is :—Baked Flour 1 lb., Biscuit Powder 1 lb., Refined Sugar in powder 1 oz., Milk Sugar 6 ozs., Finest Oat Flour 8 ozs., Powdered Malt 4 ozs.—P.J. ii./09,334.—Note Hutchinson's remarks above.

Malted Foods described.—B.M.J. i./10,86.

Pasteurisation of Milk.—So-called "sterilising"—consists in raising it to the temperature of 70° C. (158° F.) and maintaining it at this temperature for 30 minutes. This effectually removes all pathogenic and the bulk of the non-pathogenic organisms. So treated, milk keeps sweet two or three days. The process may be approximately carried out by plugging convenient sized bottles filled with the quantity for one meal, heating in a pan surrounded with water to nearly boiling point, remove from the fire, cover with a clean cloth and allow to stand for half-an-hour. Then cool rapidly, and store in a cool place.

Pasteurisers are of two kinds.—**'Bulk,'** in which the milk remains for 20 minutes at 140 to 165° F., or **'Flash,'** in which the milk flows continuously through the apparatus at up to 180° F. It is then cooled. Either method kills pathogenic organisms, *e.g.*, tubercle, typhoid or diphtheria and reduces bacterial content in general. By heating above 165° F., the Lactic Acid producing organisms are more or less rapidly killed, whilst the more resistant putrefactive forms largely survive—hence this milk is of danger if kept later at temperatures favourable to bacterial growth. Milk pasteurised at above 165° F. for any time and afterwards kept at above 65° F. undergoes what may be called a "peptolytic" change allied to putrefation, and this may actually occur if pasteurisation took place at 170—175° F. **Milk must be kept cold—below 50° F.** (not in vacuum flasks or warm pantries). Similarly *boiling* milk and allowing to spontaneously cool is deprecated. Indeed, it may be well to add a sufficiency of Lactic Acid producing organisms to reproduce the original condition of the raw milk. Regarding the relative nutritive qualities of heated and unheated milk—the less heating the better —R. T. Hewlett, Na., Feb. 6, 1913.

Control of Milk pasteurisation.—The minimum temperature requirements usually set are, for the continuous type of pasteuriser, 160° for one minute; for the machine equipped with the holding device, 140° F. for twenty minutes. The percentage reduction standard usually adopted is a 99% reduction in the bacterial content of the raw product.—G. Koehler, Jl. A.M.A.

Milk heated in a closed vessel to 60° C. for 20 minutes becomes sterile as regards micro-organisms.—L. ii./13,1548.

To obviate the **constipating effect** of Pasteurised milk for infant feeding add 5 to 20 grains of *sodium bicarbonate* to the quart of milk, also a little milk sugar. The Sp. Gr. of the final product must be 1·033.—B.M.J. i./05,1182.

The raising to 190° F. makes milk perfectly safe from contamination with B. tuberculosis, and this does not impair its nutritive value.—N. Raw, B.M.J. i./21,596.

See also Nat. Milk Conf., Frequency of bovine infection in the human subject.—B.M.J. ii./22,820.

MINISTRY OF HEALTH ORDER, 'MILK (SPECIAL DESIGNATIONS) ORDER, 1922'—PASTEURISED MILK must have been heated at a temperature of 145° to 150° F. for ½ hour and then cooled to 55° F.

The 'Flash' method of pasteurising is entirely replaced in U.S.A. by the 'holding' method in which the Milk is kept at 145° F. for 30 minutes.—L. ii./22,930.

Pasteurisation of Milk in New York City is accountable, according to Dr. Charles E. Worth, for the reduction of the death-rate of infants under one year from 165 per 1,000 born to 70 per 1,000 born.—M.P.C., Oct. 25/22,343.

Public Health Report on the effects of using fresh milk and various forms of preserved, reconstructed, pasteurized and dried milks, with a study of their vitamin value.—J. M. Johnson, T.D.B. Vol. 19, 1922/766.

Impossible that pasteurisation could be productive of any general impairment of nutrition.—E. Pritchard, L. ii./22,925.

THERMAL DEATH-POINT OF THE TUBERCLE BACILLUS IN MILK. As a result of experiments the author draws the following conclusions:

(1) By using 25 strains of tubercle bacillus no wide difference in the death point was found.

(2) The thermal death point is practically similar for human and bovine types.

(3) Previous variations in results due to too little care in carrying out experiments.

(4) 20 minutes exposure at 60° C. required to prevent milk so treated carrying infection to the guinea-pig.

(5) 5 minutes at 70° C. required to ensure the same result.

(6) Of the two combinations of time and temperature factors the former excels the latter when the *food value* of the treated milk is also considered.

(7). Until bovine tuberculosis can be stamped out at its source pasteurisation is the only safe method of rendering milk safe for human consumption.—F. W. Campbell Brown, L. ii/23,321.

The question of B. tuberculosis in milk is more specifically dealt with in Vol. II.

It is impossible by means of a "Flash" pasteuriser to ensure the definite results aimed at in pasteurisation.—J. M. Hamill, Ministry of Health Report, L. ii./23,340. See also Vitamins.

Next to Mother's Milk comes Cows' Milk *simply* brought to the boil (scalded) and *diluted with water* in the usual proportion. Barley or lime water according to this writer is not desirable (but *cf.* p. 584, Are infants capable of digesting starch ?) Sterilised Milk not good, —children may become anæmic. *It is often contaminated worse bacterially than ordinary milk. A lot of nonsense on sterilised milk has been written.* Gain in weight of a child is not everything,—not necessarily progress in development. Scalded milk and water, equal parts, every 2½ hours, brought a child up to normal after it had sampled four kinds of foods and two milk mixtures.—Burnet.

Probably the essential factor in a case of infantile scurvy was the *prolonged sterilisation or boiling of the milk*,—the danger from milk which has only just been raised to the boiling point for a very short time seems fortunately to be infinitesimal.—L. i./11,662.

Antiscorbutic value of Cow's Milk. Investigation at Lister Institute.—B.M.J. ii./19,681.

The more nearly the proteins of food approximate in structure the tissue proteins the more completely satisfactory and easy of utilisation will they prove to be—this is, of course, of special importance to the newly-born infant with imperfectly developed digestive ferments. Mother's milk is an optimum diet at that period of life ; no substitute can be produced for this. The constituents of cows' milk may be rearranged to make them present in proportions almost exactly similar to those in breast milk, but, however completely we may humanise cows' milk, it is not in our power to make it human, nor to give to its proteins the peculiar stamp of specificity.—A. E. Garrod.

Boiled versus Unboiled Milk.—Experiments on animals fed with milk of another species. Such small differences as were found in

the nutritive values of raw and boiled milk were in **favor of boiled milk.**—L.G.B. Report.

Mr. R. Mond stated that his experiments showed there is no danger of Tuberculosis being conveyed from the milk of tuberculous cows to human beings. He claims sterilised milk will not support life of kittens—they died within a fortnight of starvation. Sir Almroth Wright holds the result is due to the precipitation by boiling of the lime and Magnesium Salts.—C.D. i./14,5.

The relation of the chemical composition of human milk to chronic diarrhœa and eczema in nurslings. The average newly-born infant needs daily a quantity of nutritive material sufficient to produce 300 calories. In human milk the abundance of the heat producing element, fat and sugar, is in striking contrast with the relative poverty in proteins and in salts. The amount of fat in human milk varies as the hour and the phase of the feed, and also according to the individual peculiarities of mothers, whilst the lactose is remarkable for the constancy of its amount, an average of 5·82%.—Pr. Feb. 1911, p. 282, *et seq.*

Milk boiled at home for 2 to 5 minutes is in every way to be preferred to fresh or commercially pasteurised milk.—J. Brennemann, J.Am.Med.Ass., 1916,67,1413, per P.J. i./17,23.

Sterilisers (for milk). Aymard's Patent is in use.

Condensed Milk standardised under Ministry of Health (L. i./23, 972). Labels to state clearly the types. The composition to be :—

	Percentage Milk Fat.	Percentage of all milk solids, including Fat.
Full cream unsweetened ..	9·0	31
,, ,, sweetened	9 0	31
Skimmed unsweetened ..	—	20
,, sweetened	—	26

'Berna' Condensed Milk contains apparently less cane sugar than the average, hence Fat content correspondingly higher.—Pr. Mar. 22/227.

Infant Feeding in the Tropics.—In the absence of breast feeding Dried Milk or a good brand of Condensed Milk is best.

In gastro-enteritis stop milk feeding and give nothing but warm albumen water in large quantities (20 to 40 ounces containing the whites of 3 or 4 eggs) according to age of child during 24 hours. Castor Oil a few drops. In dysentery stimulants are not to be used. Intestinal injections, Boric Acid Simaruba, etc., essential.—B.M.J. ii./09,770.

Banana Flour as Infants' Food :—

One ounce of Banana Flour rubbed up with a pint of milk and then boiled for five minutes makes a satisfactory gruel. Prevents the formation of a leathery coagulum of casein, and satisfies the appetite of hungry infants.

The nutritive properties of banana flour are high as shown by the following composition :—Water 15·5, Albuminoids 2·5, Starch, Sugar, Gum, etc., 77·7, Oil 1·0, Fibre 0·7, Ash 2·7% Some prefer a 'banana meal' which contains less fibre.

Are infants capable of digesting foods which contain starch? Infants from birth secrete an amylolytic ferment. The glands, notably the pancreas, can be trained by a starchy diet to secrete more. This can be begun shortly after birth in the case of bottle-fed infants. **Barley Water** contains about 2% of starch. Mixed with an equal quantity of milk, this is beneficial, encouraging the growth of lactic acid bacilli and the formation of lactic acid, thus preventing the growth of proteolytic bacteria. Commence with a milk mixture containing not more than 0·5% of starch, and gradually increase the amount very slowly up to 3 to 5%. If the stools become very acid, or if they give a distinct starch reaction, the percentage of starch in the diet must be reduced.

Milk contains more calcium than lime water. Milk is, therefore, of value in hæmorrhage—where it is desirable to increase the calcium in the blood—also in many forms of pneumonia. Butter-milk is useful in typhoid and in gastro-intestinal disorders of children.

In post-partem hæmorrhage ½ to 1 litre of milk by rectal injection is good as a hæmostatic.

Whey Powder.

This is virtually Desiccated Milk deprived of fat and Casein. It has approximately the composition: Soluble Lactalbumen 14·25, Milk Sugar 74·45, Fats 0·27, Mineral Matter, chiefly Phosphate 9·8, Moisture 1·2%. It is practically sterile. It is employed in conjunction with cows' milk for producing a milk with a reduced proportion of Casein, and also of higher Sp. Gr., with the result that the amount of fluid is proportionally lessened. Or it may be prepared with water and cream,—the cream being low in Casein, sugar and ash, but high in fat, whilst the whey is low in fat, but high in ash, sugar and lactalbumen. It may also be used alone to produce Milk Whey by dissolving in water.

Human Milk contains on an average 0·8% Casein and 0·6% Lactalbumen; **Cows' Milk** 2·7% to 3% Casein and 0·2 to 0·3% Lactalbumen. *Cf.* also p. 580 for other constituents and *Vol. II.* In diluting Cows' Milk with water to reduce the Casein content it is obvious that the deficiency in Lactalbumen is rendered still more in error.

It is also clear, if the above figures be correct, that a breast-fed child taking 1,000 Gm. of milk in a day, will receive 6 Gm. of Lactalbumen. *A child receiving, say,* 600 *Gm. of Cows' Milk would receive only* 1·8 *Gm., at most, of the same albumen. This lactalbumen is soluble, i.e., it does not undergo precipitation with acid and digestion with pepsin and pancreatin before assimilation.*

Arguing by analogy with the high albumen content in Colostrum which the newly born calf receives (*cf. Vol. II.*), the advocates of Lactalbumen, as an addition to cows' milk for infants' milk, claim that it is important to supply the infant with a form of protein which makes small demand on the digestive glands, and which does not require much transformation before it can be absorbed.

Koumiss (Artificial). *Syn.* ✱KEPHIR (T.M. 298465, Class 42).

Dissolve Grape Sugar ½ ounce in water 4 ounces, and add 20 grains of yeast and cow's milk 4 ounces. Place in a quart bottle and fill up with milk, cork and wire. Keep it cool and shake it frequently during four days. Koumiss thus prepared contains some alcohol (1 to 2%) and lactic acid (about 1 to 2%). The original Koumiss of the Tartars was made from mare's milk by using the peculiar Kephir ferment, which swells up on soaking in milk. This consisted in reality of yeast cells with certain bacteria (*B. Caucasicus*, Kern)

In some respects it resembles mother's milk more than cow's milk.

Uses.—A food used in the Caucasus as a stimulant in exhaustion and in convalescence of phthisis. Was recommended by Metchnikoff as a nutritive and as an intestinal antiseptic.

Kephir Grains are available commercially. In tuberculosis and other wasting diseases. *See also Acidi Lactici Bacilli, Vol. II.*

Goat's Milk.—This appears to lie between human and cow's milk. It is recorded that a baby of seven weeks received 3 ozs. a day, the amount being increased as the natural supply failed, until at three months it was taking six feeds a day of 4 to 5 ounces each and nothing else—the milk was given straight as it came from the goat. Digestion was perfect and there was a gain in weight increasing from three to four ounces to from 6 to 8 ounces each week. A first class food requiring no preparation. The fat is both in large proportion and in finer globules. Not only do goats not suffer from tuberculosis, but their milk has a wonderful effect on children, especially on such as have to be brought up artificially and with whom cow's milk disagrees.—Brit. Goat Society.

Casein Preparations.

Casein is the principal albuminoid constituent of milk and is present in solution in the aqueous portion of the milk as an alkali-albuminate (the alkali in milk is about 0·5%).* It is precipitated by dilute acids (*e.g.*, acetic acid, which is utilised in method of estimation, *v. Vol. II.*). Casein is, furthermore, thrown out of solution by the action of the **rennet ferment.** Casein is present in milk to the extent of 3 to 5% (usually about 3½%). Once thrown out of solution it is not readily dissolved again except with added alkali or hydrochloric acid. **Cheese** is chiefly casein with a little fat.

Flocculent Casein, *see* Casumen, *infra* (specially prepared) is, however, soluble in water.

***Savore** (T.M. 255039), a preparation of milk and cereal proteids and albumoses with carbohydrates.

***Plasmon** (T.M. 271845), a soluble milk albumin (Casein). Nutritive and easily digested. Plasmon biscuits, Arrowroot, Cocoa and Chocolate are prepared.

Contains Phosphorus in organic combination to extent of 1·46%. Total Phosphoric Acid found was 2 88%. Milk protein differs from other proteins in containing Phosphorus in combination.

For gastric ulcer, this and similar foods are much employed.

***Casumen** (T.M. 239,245), A soluble form of Casein (Flocculent Casein) containing a very high percentage of protein (90%). For use in all cases where there is poor nutrition. It contains practically no fat or sugar. It may be mixed with cocoa, chocolate, bread (10%) for diabetics, &c.

Soluble and other Caseins, Modes of Making.—P.J. ii./12,155.

Pigmentum Casein St. M.'s H. *Syn.* **Unguentum Caseinæ.** Casein 14, Potassium Carbonate ½, Glycerin 7, Vaselin 21, Zinc Oxide ½, Phenol ½, Water to 100. If good Casein be used we find this is almost too thick—add a little more water. A basis for skin medicaments. Thymol *q.s.* may be added to preserve it.

Proprietary Foods in Infant Feeding.

Investigations of 106 foods showed that 70% consisted of baked flour. Advertising methods most misleading.—H. C. Cameron, B.M.J. ii./15,287.

Sale of Patent Infant Foods to the public should be made illegal. —L. i./11,1203.

The constituent of mother's milk on which the infant depends is ***Fat.*** The mother must be well nourished.—B.M.J. ii./10,1139.

Many proprietary Infants' Foods are *deficient in fat.* This may provide partial explanation of the characteristic liability to infection so frequently seen in fat but pasty babies reared on this type of food.—J. C. Drummond, L. ii./18,482. *cf.* Vitamines.

Proprietary Infants' Foods are thus classified :—

1. Foods with a basis of dried cow's milk but mixed with flour.
2. Foods consisting mainly of flours, the starch of which is practically unaltered or altered only by heating.

* Some hold that Casein exists as Caseinogen, and that this is converted into Casein by ferment. Schmidt states that Casein occurs in milk as Calcium Albuminate.

3. Foods consisting mainly of flours mixed with a proportion of malt flour or malt extract, but containing much unaltered starch which is not converted into soluble products during the process of preparing the food for infants in accordance with the directions given on the package.

4. Foods containing flours, but also containing active diastase or pancreatic ferment, so that if the food is carefully prepared according to the directions on the package the starch is appreciably altered.

5. Foods manufactured from flours, the starch of which has been mainly or partially converted into soluble products during the course of manufacture.

The observation is made that most proprietary foods are deficient in fat and also in fat-soluble factor, whilst a number are also stated to be inadequate with respect to the water-soluble factor, and all are deficient in the anti-scorbutic factor.—From Med. Res. Com. Report, per C.D. Feb. 14, '20. *See also* Roy. Soc. Med. Discussion, L. i./20,604.

Excess of sugar in proprietary foods is a common cause of infantile dyspepsia, especially amongst the poor. These foods (7 classes are described) have, however, a field of utility. Condensed milk with excessive sugar is liable to produce fermentative dyspepsia. For children over six months the low fat content is very liable to produce rickets.—B.M.J. i./13,872.

Proprietary Foods and Milks. A good summary, including Allenbury's Food, Mellin's, Horlick's and a number of nitrogenous foods.—E. Cautley, Pr. July, 1922.

***Glaxo** (T.M. 364394 and 433121).

This infants' food is a dried milk containing added Lactose. In addition to the standard Full Cream Glaxo there are issued, No. 1 or half cream and No. 2 or three quarters cream. The Full Cream contains approx. 25·5% Fat and 42·5% Lactose, the 'No. 1' 15·8% Fat, 49·2% Carbohydrates, the No. 2 20% Fat and 45% Carbohydrates. The Carbohydrates in Nos. 1 and 2 consist of lactose with nearly 10% Cane Sugar.

Savory & Moore's Food is stated to contain the active enzymes and vitamines of malt. It contains no dried milk. In preparing it for use it is not heated sufficiently to impair vitamines or enzymes. When so prepared it approximates mothers' milk.

***Vitafer** (T.M. 324675, 333647, 347470).—A tonic food.

Dose.—Two teaspoonsful three or four times daily mixed with milk porridge, cocoa or any fluid food. For children under 10 three teaspoonsful daily; infants proportionately.

The "Lancet" found Protein not exclusively Casein as some is present as Milk Albumin. Moisture 6·3%, Mineral Matter 10·7%, total Protein 80·4%, Fat 2·6%. Total Phosphoric Acid as Glycerophosphates 3·84%.

Other Food Preparations.

***Benger's Food** (T.M. 321,220). A wheaten flour preparation containing the natural amount of starch with Trypsin and Amylopsin. It is used with fresh milk or milk and water in proportion required, artificial digestion being stopped at any point by boiling. The Trypsin acts on the milk used. After 15 minutes self digestion the percentage of unconverted starch is 1·5. After 30 minutes 0·5. The digestion can be conducted for from 5 to 45 minutes as desired. It gives the body nourishment with complete or partial rest to the digestive system. The point of the preparation is that if the digestive system, however weak, can do any work at all, it should be given it to do to the extent of its power. The fat may be increased by adding cream or upper-milk.

Gluten.—*Syn.* VEGETABLE ALBUMEN. A protein mixture obtainable from wheat flour as an elastic mass when moist.

Preparation.—Knead flour with about half its weight of water to produce a stiff dough. Knead further in running water till free from starch. Wheat Protein is digested in less time than the majority of animal proteins.

Synthetic Milk.

Preparations have been suggested to be made from Soya Beans *e.g.* Solac (T.M. 346263) also from Pea Nuts, but they are apparently not now in commerce. Further on—see last Edn., p. 568.

Importance of Carbohydrates in present day economy. Plants can be stimulated by Carbon Dioxide. The sugar beet is a biennial. Wood is being depleted for paper-making.—P. Haas, P.J. i./22,222.

NEM. (NAEHRUNG'S EINHEIT MILCH). A unit used by Von Pirquet. The energy contained in 1 Cc. of milk. It is based primarily on calorimetry, aided by calculations which deduce the energy requirements of an individual from his body weight and his sitting (not his standing) height. A dietary is based upon it.—Prof. Gowland Hopkins, L. i./21,3.

DIABETIC FOODS.

Starchless Bread (both brown and white) also Biscuits and Flour are manufactured. These are generally **Gluten Products** (more or less free from Starch) and Bran foods. Previously they were the only foods available for diabetics. **Casein** (with eggs and butter) has latterly been employed. Casein bread and biscuits (Callard & Co., London) are free from Carbohydrates and are palatable.

It is best to give this casein bread with a weighed quantity of starchy bread when desired. 'Gluten Bread' may contain as much as 55% of starch. It *can* be made with 7% of starch, but it is not palatable.

Home made Diabetic Bread from milk Casein of separated milk, with addition of egg white, Salt, Cream of Tartar, etc., as used at Duff House.—E. Spriggs, B.M.J. ii./21,707, L. ii./21,960.

The **Iodine Test** is useful for the detection of Starch in so-called Starch Free Foods and should be applied in cases of doubt. A deep *violet* indicates *unaltered starch*; partially altered starch will give a brownish colour. We are informed that many Continental Diabetic Foods offered for their palatability actually contain a *higher proportion of Starch than ordinary white bread.* Almonds and other nuts are also used for making bread and biscuits. Various **Sugarless Condiments,** foods and drinks are prepared. Saccharin is used as the sweetening agent.

The following lists may be useful in assisting the SELECTION OF FOODS FOR DIABETICS:—

(i) ***Foods free from Carbohydrates*** or containing less than 1%,—Beef, Mutton, Lamb, Pork, Poultry, Game, Sweetbread, Tongue, Fish, Turtle, Lobster, Eggs, Butter, Cheshire, American, Dutch and Gorgonzola Cheeses, Lard, Gelatin and 'honest' Starch and Sugar free special foods.

(ii) ***Foods containing a low proportion of Carbohydrates*** (percentage of Carbohydrate is indicated).—

Liver 1, Sausage (Pork) 1, Crab 1, Crayfish 1, Scallops 3, Asparagus 3, Celery 3, Cucumbers 3, Lettuce 3, Spinach 3, Oysters 4, Mussels 4, Stilton Cheese 3, Cheddar 4, Rhubarb 4, Tomatoes 4, Mixed Pickles 4, Cauliflower 5, Leeks 6, Radishes 6, Mushrooms 7, Water Melons 7.

(iii) ***Foods rich in Carbohydrate***—Milk 5 or more, Whey 5, Oatmeal (thin gruel) 6, Strawberries 7, Turnips 8, Carrots 9, Beet (fresh). Cranberries and Pineapple 10, Oatmeal (boiled), Blackberries, Dried Peaches 11, Oranges 12, Parsnips, Apricots, Currants, Walnuts and Filberts 13, Apples and Pears 14, Macaroni (cooked) 16, Calves Foot Jelly, Artichokes, Peas (Green), Cherries and Almonds 17, Potatoes and Pears (dried) 18, Figs and Grapes 19, Plums 20, Boiled Potatoes 21, Bananas 22, Rice (boiled) 24, Tapioca Pudding and Cocoa-nuts 28, Chocolate 30, Mince-pie 38, Chestnuts (fresh) 42, Apple Pie 43, Bread Brown) 47, Potatoes (fried chips) 47, Bread

(White) 53, Rolls 56, Lentils (dried) 60, Bread (toasted) 61, Peas (dried) 62, Gingerbread 63, Macaroons 65, Sponge Cake 66, Oatmeal 67, Chestnuts (dried) 74, Sago 78, Tapioca 88, Arrowroot 97, Dried Fruits, *i.e.*, Apples, Apricots, Currants, Dates, Figs, Prunes, Raisins 62–78, Meal Flour, Rice, Macaroni, Vermicelli 70–80.

In the case of list (ii.) much of the Carbohydrates in some of them is in the form of Cellulose, which is not absorbed.

The majority of the above figures are from the analyses of Atwater and Bryant.—L. ii./11,1184.

ACCESSORY FOOD FACTORS.

The chemical composition of these bodies, to which the name **Vitamin** was originally given by Funk, remains quite ill defined. (For numerous extracts of this authority's papers, and communications from others on the same subject, especially with regard to Beri-Beri, see Beri-Beri, Vol. II.)

In our last edition we stated that they are essential to growth, and this can be shown by eliminating them from diet in animal experiments, for example, an animal fed merely on pure protein, fat, the carbohydrates and the inorganic salts of food will die within a short time. A vast amount of research has, since that date, been conducted with, in some instances, almost incredible conclusions.

Three main types of these substances are defined, namely, the '**Fat Soluble A,**' '**Water Soluble B,**' and the '**Water Soluble C,**' **Factors.**

Distribution of factors. The following, based on a table in a paper by J. C. Drummond (L. ii./18,482), gives some idea—the one or more + signs indicate relatively a rough content of the factor, while the — shows absence.

Foodstuff.	'Fat Soluble A.'	'Water Soluble B' or Anti-beriberi factor.	'Water Soluble C' or Antiscorbutic factor.
Milk	+ +	+ +	+
Butter	+ + +	—	—
Cream	+ +	+	+ ?
Separated Milk	—	+ +	+
Egg Yolk	+ + +	+	?
Egg White	—	+	? —
Beef Fat	+ +	—	—
Lard	—	—	—
Margarine	—	—	—
Vegetable Oils	—	—	—
Cod Liver Oil	+ + +	—	—
Wheat, Whole Grain	+	+ +	—
Rice, Polished	—	—	—
White Bread	—	—	—
Whole Meal Bread	+	+ +	—
Cabbage, Fresh	+ +	+	+ + +
Spinach	+ +	+	+ + +
Oranges	—	—	+ + +
Onions, also Apples	?	—	+ + +
Lemon Juice			+ + +

Absence of the '**A**' **Factor** both by animal experiment and by observance of conditions amongst the poor, where such foods as milk, butter and eggs are not available, has been proved to be the fore-runner of malnutrition and rickets—a 'deficiency' disease.

The total absence of any of the factors in either Lard, Vegetable Oils, Margarine and White Bread is a serious contemplation. Note, however, that the majority of animal fats—fish oils in particular—contain a fair proportion of 'A' factor. *cf.* E. Mellanby, L. i./19,407.

Prof. Halliburton (B.M.J. i./19,583), in reviewing the knowledge of these substances in a paper on deficiency diseases, mentions examples of this type of ailment as beri-beri, pellagra, scurvy (and rickets as above mentioned)—all caused by the lack of Vitamins. Obscure and apparently trivial complaints are probably also to be included.

'Water Soluble B' Factor, which is removed in rice polishings may be termed the Anti-neurotic factor. Its absence has been proved to cause beri-beri.—*q.v.* for further considerations.

'Water Soluble C' Factor is the Antiscorbutic factor. Orange and lemon juice contain it in particular.

With these three definitions, of somewhat negative character we admit, in mind, we will survey some of the papers which have been written, arranging the matter as far as possible in respect of the Vitamins in question.

The word Vitamin should be spelt without the final 'e.' **'Advitant'** was proposed by Prof. Armstrong, as a preferable name. —Prof. Haliburton, B.M.J. ii./21,493—but it is not euphonious.

Causes of our C3 population. Widespread diseases, such as dysentery, diarrhœa, and even tuberculosis may one day be relegated to the group of deficiency diseases. Tuberculosis is always associated with fat deficiency, and any improvement in the condition of the patient is always accompanied by increase in fat deposit in the tissues. A lack of knowledge of elementary facts with regard to cooking of food among the women of this country is deplorable. Margarine, now made from vegetable oils at high temperature, is the diet proved by experiment to produce rickets in rats.—T. E. Knowles Stansfield, B.M.J. ii./21,1021.

The whole subject has been exclusively the property of English-speaking nations. The Germans, Austrians and French are far behind us regarding the matter.—Sir Walter Fletcher's Address, B.M.J. ii./22,942.

Destruction of Vitamins by heat and oxidation.

The position generally held at the time of our last edition was that the 'A' factor is stable at 100° C. and probably at 140° C., the 'B' is comparatively stable at 100° C. and slowly destroyed at 120° C., while the 'C' factor is gradually destroyed above 50° C. and rapidly above 80° C.—see a paper by J. C. Drummond, L. ii./18, 482. Further work has shown that the question of *time* and conditions favouring *oxidation* enter into the problem; points of interest are mentioned under each Vitamin.

Fat Soluble 'A' Factor.

Destruction by heat.

Boiling with aeration causes loss of this factor.—S. S. Zilva, L. i./21,478. See also A. F. Hess, *ibid.* 938, and further abstract of Zilva's paper under Vitamin 'C.'

Vitamin Fat Soluble A may be destroyed by oxidation. While the Vitamin in butter is not diminished by exposure to 120° C. for 4 hours, it is in the same period greatly diminished, and in 12 hours completely destroyed, if the butter is thoroughly aerated during the heating, *i.e.* one must conclude that, though fairly resistant to heat, this Vitamin is readily destroyed by oxidation.—B.M.J. i./21,237; i./22,236. Heating at 120° C. and 32 hours aeration destroys it. —E. Mellanby, B.M.J. i./24,895.

Monkeys fed on autoclaved food and killed, and intestines examined, showed marked difference from normal.—R. McCarrison, B.M.J. i./20,249.

Prolonged boiling, as in making stews, destroys probably most of Vitamin A. *It is said* that Vitamin A survives for many months in tinned meat.—Leader, B.M.J. i./22,236.

Pasteurisation, Heating to 145 or 150° F. for ½ hour, Effect of, on the vitamins in milk. Pasteurisation has practically no effect on Vitamins A and B, which have relatively high resistance to heat, —J. M. Hamill, Ministry of Health Report, L. ii./23,339. (Doubt on this point existed in 1922).

Vitamins in ice cream made from pasteurised products. Vitamin A apparently unaffected by pasteurising or freezing. Normal growth induced by 1 Gm. of ice cream. Ophthalmia cured by 0·25 Gm., containing 25 mgr. of butter fat.—A. H. Smith, per Jl. Trop. Med., Feb. 15/23,66.

Lipochrome Pigments (organic colouring matters) and Fat Soluble "A" Vitamins. Relationship between. As a general rule the naturally coloured fats, *e.g.* butter and cream, egg yolk, cod liver oil and cereals, *e.g.* yellow maize, are rich in same.—O. Rosenheim and J. C. Drummond, L. i./20,862,874.

Rickets to be treated with Cod Liver Oil.

E. Mellanby considers there is doubt as to the identity of the Fat Soluble A and the anti-rachitic factor. The children of the Island of Lewis, in spite of bad domestic conditions, are relatively rickets-free. The explanation is the large use of cod livers—a first rate anti-rachitic, and the plentiful use of oatmeal, eggs and fish. Remarkable immunity to rickets of Jews as against Gentiles Dietary of the former includes much fatty foods—oil, eggs and milk, —L. i./20,856. See also Roy. Soc. of Med. Discussion, *ibid.* 604.

There are other factors in diet, the importance of which is unknown. The thyroid gland was examined of dogs fed on diet containing various fats. When fed on butter, cotton-seed or linseed oil the thyroid was invariably large, and resembled that of Graves's disease, whereas on a diet of Cod Liver Oil it was small and histologically normal.—E. Mellanby, B.M.J. i./21,779.

Cod Liver Oil superior to other substances which contain Fat Soluble Accessory Factor in the treatment of rickets. A sample of crude, unrefined *Cod Liver Oil was found to be* 250 *times as potent as butter.* Refining of Cod Liver Oil (*e.g.* with Ozone) is possibly excessive.—S. S. Zilva, L. i./21,323. See also B.M.J. i./22,236.

Two mgr. of Cod Liver Oil per day sufficed to supply a rat with Vitamin A. Nearly all this is fat. The active constituent is therefore in minute amount.—J. C. Drummond, L. ii./21,623,753.

Experimental Rickets. The fact that Butter fat is a feeble anti-rachitic is of great importance in so far as the explanation of the occurrence of rickets in the human being is concerned.—Hess and Co-workers, L. ii./21,668.

Neutral fats, from a purely physiological point of view, are dispensable constituents of food provided the other foodstuffs supply sufficient of the vitamin frequently found in association with natural fats. Young rats were grown from weaning to maturity on diets deprived of neutral fats, as far as possible, and showed normal development and behaviour.—J. C. Drummond and K. H. Coward, L. ii./21,698.

Work at a large foundling hospital in Vienna. Fat soluble accessory factors and antiscorbutic juices stimulated growth.—H. Chick and E. J. Dalyell, B.M.J. ii./21,1061.

Comparative treatment of cases of hunger-osteomalacia in Vienna in 1920 with *Rape Oil* containing *added Phosphorus* 0·01% and with Cod Liver Oil without added Phosphorus. Doses of 100, 150 and 200 Cc. weekly of each were given. The smallest dose of the Phosphorised Plant Oil gave the worst result and the *largest doses of Cod Liver Oil* the *best*. The smallest dose of Cod Liver Oil was better than the largest dose of Phosphorised Plant Oil. It was provisionally concluded that cure of the disease was due to addition of Vitamin A. rather than of fat as fat to the diet. It is possible that the *addition of Phosphorus to Cod Liver Oil* might hasten the cure of osteomalacia. Had the addition been made it is possible its superiority over the vegetable oil might have been even more marked.—E. M. Hume and E. Nirenstein, L. ii./21, 849; Jl. Trop. Med., Jan. 15/23,32.

Rickets, metabolism in. Cod Liver Oil definitely serviceable. It is thought (Schloss) that there is no special efficacy in the oil alone, but good results are obtained by giving it ***in conjunction with Calcium Salts*** presumably by a more efficient absorption of the latter.—Amy Hodgson, L. i./22,945. Personally, we rather favour this view.

Pharmacological value of Cod Liver Oil. Crude oil contains more A. factor than any other foodstuff. It is stored by animals in their fats and occurs in large quantities in milk fat and egg yolk. The content in milk depends entirely on the diet of the animal. It may be almost completely absent from the milk of stall-fed cows. (Vitamin A. being contained in the green leaves and growing parts of plants). Rickets, osteomalacia, kerato-malacia and war œdema are all related to lack of vitamin A.—B.M.J. ii./21,245.

Land animals cannot synthesise vitamin "A." They obtain their necessary supplies of vitamin from chlorophyll-containing plants, either directly, by eating green vegetable matter, or indirectly, from milk or flesh of other animals. Similarly, in the case of sea animals, the whole of vitamin "A," required to support life in the sea, is synthesised by plants containing photocatalytic pigments.

The oils of other fish are quite as good as Cod Liver. 'Steamed' oils are as good as those made by the old rolling process.—B.M.J. ii./22,610.

In support of the Vitamin Theory, to confute Prof. Jundell. [Prof. Jundell at Stockholm adduced a theory that it is due to a disturbance of the endogenous products of ferments (hormones) caused by overloading the general nutritive functions within certain endocrine organs.—L. ii./22,727.]—V. H. Mottram, L. ii./22,832.

Mellanby's work (as to vitamin A. on rickets in puppies) confirmed by work on rats. Calcium is also of prime importance.—V. Korenchevsky, B.M.J. ii./21,547.

Value of various fats as foods from antirachitic point of view. Cod liver oil, beef suet, butter and egg yolk good.—E. Mellanby, B.M.J. i./22,790.

The subject of diet and sunlight is also dealt with by E. Mellanby, who suggests a typical diet for children with severe rickets to comprise, milk 1 to 1½ pints; beef dripping 1 to 2 oz. with bread; meat 1 to 2 oz. mixed with potatoes; 1 egg; milk pudding and 1 orange, combined with 1 to 4 drachms Cod Liver Oil thrice daily. *However unhygienic a kennel with no access to sunlight, a properly fed puppy will remain free from rickets.* Sunlight of secondary importance.—E. Mellanby, B.M.J. ii./22,852, see also lengthy discussion by numerous authorities, *ibid.* p. 853 *et seq.*

Cod Liver Oil, the cheapest form of vitamins.—Milk, green vegetables, and especially raw salads, are important. Diets, as a rule, are rich in phosphorus but deficient in calcium. A remedy might be to ***add about 2% Calcium Carbonate to butter.***—Prof. E. Mellanby, B.M.J. i./23,192.

The *separation of butter from milk spoils both* substances from the point of view of anti-rachitic effect—(this seems to us a good point). To get the best anti-rachitic effect from butter Calcium Carbonate should be added to the diet.—E. Mellanby, B.M.J. i./24,895.

There is no more interesting chapter in biology than that now opening, which seems to point to Cod Liver Oil being literally bottled sunlight.—Sir Walter Fletcher, B.M.J. ii./22,942. Its action almost specific.—B.M.J. i./23,905.

The richest Cod Liver Oil is probably obtainable from fish which have returned to the feeding grounds after recovery from spawning. Lofoten Oil well spoken of.—F. W. Gamble, Chairman's Address, B. P. Conf., 1923.

Excess of Calcium in diet is not in itself sufficient to prevent rickets. The disease is produced in young rats by a deficiency of anti-rachitic fat soluble Vitamin alone, even when Calcium and Phosphate in the diet is more than sufficient for health.—V. Korenchevsky, B.M.J. i./23,802.

The work done will prevent one of the most widespread and damaging diseases.—B.M.J. i./23,905.

As a result of the Vienna Expedition Cod Liver Oil has been conclusively proved to be a preventive and cure for rickets. A diet which in winter permits the development of rickets may be in summer, with the help of sunlight, adequate to stave it off. The disease may be quickly cured by sunlight or the Mercury-vapour lamp. Evidence obtained that the administration of Cod Liver Oil to the mother may greatly increase the value of her milk.—Leader, L. i./23,1169.

Final account of Vienna investigations.—M.R.C. Report.—B.M.J. i./23,987.

McCollum, Simmonds, Shipley and Park found evidence that the calcium depositing property of Cod Liver Oil was greater than that of butter and their theory was that the calcium depositing or anti-rachitic factor and the fat soluble A. factor were *not one and the same principle.* Goldblatt and Zilva's work tends to confirm. Conclusions. (1) The growth promoting and anti-rachitic properties of Cod Liver Oil are inactivated at different rates by heat in the presence of air. (2) There is a very great disparity between the potency of these properties in spinach. (3) A certain sample of Cod Liver Oil possessed high growth promoting and anti-rachitic activity.—L. ii./23,649.

Prof. Mellanby demonstrated the dietetic mistake of feeding animals on cereals, *e.g.* bran or oats. Dogs fed on a diet deficient in Vitamin A., leading to rickets, *got worse when fed on cereals*, white flour being found least toxic and next in order rice and rye ; oatmeal and wheat-germ were found to be especially liable to intensify the condition. The nature of this toxic factor is still undiscovered, but antagonists to it include Calcium Carbonate, ultra-violet light and Cod Liver Oil.—L. i./24,229.

Skimmed milk contains only about one half the Vitamin A present in whole milk.—L. i./24,93. Xerophthalmia in Denmark due to export of Butter.—E. Widmark, L. i./24,1206. See also Leader, *ibid.* 1218.

Contra Views in the matter of Fat Soluble A Vitamins and Rickets.

Experiments on pups showed that by attention to *strict cleanliness* it is possible to rear pups free from rickets in a laboratory, even on low milk fat dietary. It is easy to rear them in the open air even on a diet poor in milk fat. Probably a bacterial infection plays an important part in etiology.

Under ordinary laboratory conditions a liberal allowance of milk fat up to even 14 grammes per kilo of body weight neither prevented onset of rickets nor cured it when it had developed. The results do not support the Med. Res. Council Committee that rickets is a deficiency disease, due to lack of anti-rachitic factor, associated with milk fat.—D. N. Paton and A. Watson, B.M.J. i./21,594.

Rickets probably caused by excess of starch.—W. P. S. Branson, *ibid.* 685.

In India, contrary to what prevails here, rickets is a disease of the wealthy. Rickets is different from the known Deficiency Diseases, Scurvy and Beri-Beri. It cannot be cured by large doses of Cod Liver Oil. It would appear the etiology of rickets is associated with confinement—whether due to want of fresh air, lack of exercise or absence of sun's rays, it is impossible to say. It may possibly be of the nature of an infection.—L. Findlay, B.M.J. ii./22,849.

Paton denies that rickets is a deficiency disease. He attributes it to bad housing and has obtained negative results with feeding experiments. Central Europe and the war would go to prove that it is a deficiency disease because

100% of infants of nine months in Vienna have rickets. Addition of cod liver oil to the diet of the mothers of breast fed infants in Vienna produced beneficent effect. In extracting cod liver oil the minimum of exposure to oxidation should occur.—B.M.J. ii./21,245.

That rickets is due to deficiency of fat soluble A. vitamin is not proved. Probably due to diet actually deficient in fresh animal food—suitable proteins. —G. Bruton Sweet, B.M.J. ii./21,1067.

Theory of the metabolic disturbances in rickets and of its association with tetany. An error in the metabolism of Lecithin, probably in the liver, may be a causal factor in the failure of bone formation in rickets. This faulty metabolism may in some cases be accompanied by an increased conversion of choline into guanidine compounds, thus explaining the association of tetany with rickets.—D. Noel Paton, B.M.J. i./22,378.

Mellanby's work and his critics. The weight of evidence is against the view that the specific action of certain fats and oil in rickets is due to their associated vitamin, fat soluble A.—B.M.J.i./22,20.

Rickets not entirely due to lack of Vitamin A. It is an important factor, but faulty mineral metabolism and lack of sunlight must be included.—B.M.J. i./22,955.

Light in Prevention and Cure of Rickets.—Rickets developed during winter and spring under excellent hygienic conditions, in infants receiving fresh milk from stall fed cows, to which sugar was added, and was *prevented* by a diet containing Cod Liver Oil, more milk and less carbohydrate. Both milks were low in V.A. Rickets did not develop in *summer* on either diet. It can be cured by Cod Liver Oil and by exposure to *sunlight or Mercury vapour quartz lamp.*—H. Chick and co-workers, L. ii./22,7.

One half of the breast fed infants of the poor of a large city show signs of rickets by the end of March—the peak of the rickets season. In London and New York the diet of the babies—the milk—is far more adequate and normal than the supply of light.—Prof. A. F. Hess, L. ii./22,367.

Growth of rats fed on a diet deficient in Vitamin A. affected by radiation with Mercury-Vapour Quartz lamp. It was found that such irradiation can prolong normal growth on a diet almost free or free from Vitamin A. There is an interaction between Vitamin A. and light on growth.—E. M. Hume, L. ii./22,1318. *See also* H. Goldblatt and K. M. Soames, *ibid*, 1321.

Sunlight or exposure to ultra-violet light will prevent or cure rickets in spite of faulty diet. Rickets may result from the disturbance of the calcium-phosphate balance in the diet even when the hypothetical anti-rachitic vitamin is present in what is sufficient amount. The most important factors for prevention of rickets are, adequate amounts of anti-rachitic factor (? Vitamin A.). calcium and phosphates during pregnancy and especially during lactation, and similar diet for the infant with abundant sunlight, fresh air and exercise. Annual Reports Prog. Chem. 1922, p. 199. Korenschevsky, Spec. Report No. 71. Medical Research Council 1922. See also Leader B.M.J. ii./22, 1231.

Cheadle, some 20 years ago emphasised the importance of animal fats. Mellanby and the 'Vitamin School' agree but go further and attribute fundamental importance to the factor 'A.' in animal fats. Findlay and the 'Social Conditions Schcol' want air, light, warmth and exercise.—H. Thursfield, Pr. July 22/34.

Nutrition in Etiology. In the Vienna Feeding Experiments it was found that 10 minutes daily exposure to ultra-violet light enabled rats to grow normally for some two months, even when deprived of fat-soluble Vitamin. Subsequently it was found that it was not necessary to irradiate the rats directly, but that if *empty* jars were irradiated and the rats introduced immediately afterwards the same beneficial influence on growth was secured. Rather astounding! Some influence was temporarily impressed on the air.—B.M.J. i./23,905.

The contention that defective calcification of teeth is responsible for DENTAL CARIES was answered by Black.—"The teeth of persons suffering much from caries are just as hard, just as heavy and contain just as much calcium salts as the teeth of those who do not suffer specially from caries." It has been thought lack of fat-soluble 'A' vitamin in the diet is the important factor in causation of dental caries, but evidence is wanting.—J. Sim Wallace, B.M.J. i./21,837.

Vitamin A content of milk in stall-fed cows until end of April is small but after the animals were put out to grass a week it increased and persisted during May and June.—Drummond, Coward and Watson, B.M.J. i./22,112.

During stall-feeding the Vitamin value of milk can be maintained if the ration consists of a proper balance between grains and leafy foods.—C. Kennedy and R. Dutcher, J. Biol. Chem., 1922, 50, 339.

Storage of Vitamin "A" in the liver of the rat. It would appear that a reserve is necessary for some function of the animal body other than growth.—K. H. Coward, J. L. Leigh and M. Grace Palmer, L. i./23,124

Lymphoid Tissue in Nutrition. Absence of the Fat Soluble A factor does not lead to atrophy of lymphoid tissue. See further note under Vitamin B.

Most natural vegetable oils contain no Fat Soluble Vitamin, or only in minute traces.—B.M.J. i./23,933.

MODE OF ACTION OF VITAMIN 'A.' It has a specific effect on the intestinal mucous membrane and directly or indirectly on formation of blood-platelets.—W. Cramer, L. i./23,1046. *See also abstract under Vitamin C.*

AN INDICTMENT OF OVER-FEEDING. Estimation of amount of foods not deprived of vitamins that is sufficient for man's health.—Leonard Williams, M.P.C., June 14/22,516.

The present output in vitamin literature works out at a paper every other day. A bibliography of recent literature is contained in a work by H. C. Sherman and S. L. Smith, B.M.J. i./22,840.

Tests for Vitamins. There is evidence that the old U.S.P. Test for Cod Liver Oil—dissolve the oil in Chloroform or Carbon Bisulphide, and shake with a drop of Sulphuric Acid—a violet colour is produced—is roughly proportional in depth of colour to the vitamin content.—From the work of Drummond, Zilva, Watson and others.—B.M.J. ii./22,610.

Tests showed that as much vitamins are to be obtained from an egg or an orange as from some ten shillings' worth of the best commercial product.—Sir W. Bayliss, L. ii./22,1047.

All attempts to concentrate the A factor have hitherto failed. Commercial preparations tested were found practically free from all vitamins.—Leader, B.M.J. ii./22,519.

Vitamins may be merely a BALANCE BETWEEN VARIOUS FACTORS.—W. E. Elliott, B.M.J. ii./23,199.

This country spends £500,000,000 a year on imported food. These products may be deficient in vital principles. —W, E. Elliott, B.M.J. ii./23,199. *We believe they certainly are.*

WATER SOLUBLE "B" FACTOR.

Atta, Indian Flour, contains the Aleurone layer and the wheat germ and is protective against beri-beri. Yeast Extract (Marmite) added to soldiers' diet.—W. H. Willcox, L. ii./17,677.

Destruction of Vitamin B by heat.

Prolonged boiling, as in making stews, destroys probably most of Vitamin B.—Leader, B.M.J. i./22,236. (Germinating seeds contain large amounts of Vitamin B.—*ibid.*)

This Vitamin is not destroyed by hydrolysis for 24 hours with 20% Sulphuric Acid; Phospho-tungstic Acid precipitates it completely from solution (Funk's method of isolation). Suggestion to use Fullers Earth for purification by adsorption.–A. Siedell, C. D., April 2, 21/416.

Oxidation, *e.g.*, Exposure to *Ozone,* is not so deleterious to Vitamin 'B' as to the others.—S. S. Zilva, L. i./21,478 and A. F. Hess, *ibid.* 938. *See further note under Aeration of Vitamin C.*

Though more important than Vitamin C, this factor is, in common with the latter, readily destroyed by boiling in an alkaline fluid in presence of air.—B.M.J. i./22,236.

VITAMIN B AND CANCER. A monkey fed on food—rice, wheat, bread, milk, ground nuts, fresh butter and onion—autoclaved at 130° C. for 1½ hours, died in 51 days. A portion of the stomach lining was examined microscopically and a carcinoma was found.—Col. Robert McCarrison, Pres. Oct. 1920.

FUNCTION OF THE LYMPHOCYTE AND OF LYMPHOID TISSUE IN NUTRITION. When a rat is kept on a diet free from Vitamins the animal dies. There is a profound atrophy of lymphoid tissue—obvious to the naked eye. The lymphocyte has an important and specific function in maintaining nutrition. The disturbances in nutrition which follow the withholding of Vitamin B are secondary to a specific lesion which leads to an interference of the functional activity of the lymphoid tissues. Absence of the Fat Soluble A Vitamin does not lead to atrophy of lymphoid tissue and there is no lymphopænia. Vitamin B is necessary for life, not because it is necessary for all the cells of the animal, but because it is needed for normality of lymphoid tissue. The term 'deficiency disease,' like the term 'Vitamin,' is a misnomer. These diseases have their origin, like other diseases, in specific lesions. They may be induced by different agencies of which a deficiency in Vitamins is only one.—W. Cramer and Co-workers, L. ii./21,1202.

VITAMIN B AND APPETITE. *Palm-kernel Oil* heated 4 hours at 160° C. and subsequently treated with super-heated steam at 230° C. is quite free from Fat Soluble A Vitamin, used as source of fat in rat experiments. The animals were first fed on a basal ration containing Vitamins A and B in the form of Cod Liver Oil and Marmite respectively. Results showed the Vitamin B acts by facilitating the efficient carrying out of the functions of the intestinal canal.—S. Wright, L. ii./21,1208.

MODE OF ACTION OF VITAMIN B. The digestive tract is the key to the problem. The functional integrity of the digestive tract is dependent on presence of substances with specific drug-like actions. One group (Water Soluble Vitamin B) has a specific effect on lymphoid tissue. The other (Fat Soluble Vitamin A) has a stimulating effect on the intestinal mucous membrane and directly, or indirectly, on the formation of blood platelets.—W. Cramer, L. i./23,1046. *See also our page* 594.

Two forms of Vitamin B mentioned—an acid form, soluble in water and Alcohol and a neutral form, soluble only in water. If given in large amounts has regenerative action on the nerves.—Tsukiye, T.D.B., Vol. 19, 1922,760.

For a further consideration of Vitamins in relation to Beri-Beri—especially with regard to the earlier work—see Beri-Beri, Vol. II.

WATER SOLUBLE "C" FACTOR.

Rationing of troops requires extreme care in direction of providing sufficient Vitamins. Outbreak of scurvy in the Indian troops in Macedonia was a severe lesson.—W. H. Willcox, B.M.J. i./20,73.

Vitamin (Antiscorbutic) Tablets, made by Sir P. W. Bassett-Smith's method (L. i./20,1102 ; ii./20,997), stored for over 12 months, were proved to have retained their efficacy, while fresh lemon juice imported from Messina, with and without Potassium Metabisulphite had no antiscorbutic power.

TINNED TOMATOES in 4 Cc. doses to guinea-pigs are also efficient as prophylactic and curative—as shown by Hess and others in U.S.A. —Sir P. W. Bassett-Smith, L. ii./21,321. See also A. H. Macklin and L. D. A. Hussey, *ibid.* 322.

Sun-dried vegetables, tomatoes, potatoes and cabbage, retain their anti-scorbutic powers to a great extent. Sun-dried spinach, brinjal, carrots, turnips and turnip-tops have little or no anti-scorbutic properties. There was no evidence of neuritis in fowls fed on sun-dried vegetables.—J. A. Shorlen and C. B. Ray, Biochem. Jl. 1921, Vol. XV., No. 2, ex B.M.J. ii./21,536.

It has been suggested in fact that makers of Citric Acid should devise a means of recovering the Vitamin from the Lemon Juice.—C.D. '19,304, *cf.* Prof. Harden and Co-workers' clinical results under Scurvy.—Therap. Index.

Dry Fruit Juice of high antiscorbutic value practicable.—B.M.J. i./20,709. *See also* M. E. D. Campbell and H. Chick, L. ii./19,320.

Antiscorbutic juices and fat-soluble accessory factors stimulated growth.—H. Chick and E. J. Dalyell, B.M.J. ii./21,1061.

Destruction of Vitamin C by heat.

A greater destruction of Vitamin C, present in fresh milk, occurs when heated to 60° C. for ½ hour than when boiled for a minute. Vitamins are destroyed much more easily in alkaline than in acid fluid—it need be only feebly acid. Prolonged boiling, as in making stews, destroys nearly the whole of Vitamin C in vegetables. Zilva found that this Vitamin was completely destroyed by boiling one hour in presence of Oxygen, but no destruction occurred when it was boiled two hours in an atmosphere of Carbon Dioxide.

Lime Juice has only a quarter the Vitamin C content of **Lemon Juice.** The simplest way of transporting Vitamin C is by use of **dried peas.** They contain little Vitamin when dry, but produce large quantities when allowed ***to germinate.*** Germinating seeds contain large amounts of 'B' and 'C.'

It is said to be a matter of great difficulty to devise a means by which Vitamin C can even be preserved. Its concentration is at present impossible —Leader, B.M.J. i./22,236. (The author claims that Vitamin C is present in a concentrated form, in 'Omnevit.'—W.H.M.)

Pasteurisation of Milk at 145° F. for 30 minutes weakens Vitamin C. —J. M. Hamill, Ministry of Health, L. ii./23,339.

In *Dried Milk* there is a risk of losing the antiscorbutic factor (C).—B.M.J. i/20,580.

Aeration (bubbling air through) of an antiscorbutic solution (Lemon Juice deprived of acids) inactivated it. Boiling an active solution 2 hours in an atmosphere of CO_2, on the other hand, caused no diminution, but boiling 1 hour with aeration caused almost complete loss. The fat soluble factor behaves similarly. The antineurotic factor is more stable towards oxidation, *e.g.* ozone.—S. S. Zilva, L. i./21,478. See also A. F. Hess, *ibid* 938.

Lemon juice can be decitrated, concentrated and kept *in vacuo* for 6 months without loss of Vitamin C.—B.M.J. i./24,720.

Experimental scurvy. Comparative value of South African foodstuffs. Vitamin content of diet for native workers on the Rand mines to be kept high. Vitamin C to be supplied by oranges, pineapples and naartjes in season. Vegetable rations not to be given after too long cooking.—E. Marion Delf, L. i./22,576.

Scurvy is not simply due to lack of fresh food, as Prof. Mouriquand holds. It can be prevented or cured by the juice of Citrus fruit which has been preserved for more than a year.—B.M.J. i./23,195.

Ferrier Deep beer, in South Africa, which is fermented for only 2-3 hours, contains as much Vitamin C as fresh English dairy milk.—E. M. Delf, T.D.B., Vol. 19, 1922,764.

Potatoes, antiscorbutic properties of. Experiments with guinea pigs showed that fresh, raw, peeled potatoes were equal to cabbage and dandelion in antiscorbutic value. Pounded potatoes or extracted juice no use.—Bezssonof, per Jl. Trop. Med., Oct. 16/22,332.

Germinating Beans and Lemon Juice in treatment of scurvy in Serbian Army. Similar amounts of each given to patients in different wards. 70·4% of patients treated with Beans cured in 4 weeks, as against 52·4% of those treated with Lemon Juice. Importance of starting antiscorbutic remedies early and avoiding destruction of Vitamin C by overcooking food.—H. W. Wiltshire, Jl. Trop. Med., Feb. 1/23,48.

Orange Juice *intravenously* in scurvy in S. Africa has given good results 10 Cc. doses neutralised with Sodium Hydroxide and diluted with N. Saline. —S. Donaldson, per Jl. Trop. Med., Mar. 15/23,96.

The antiscorbutic Vitamin of Orange Juice, desiccated without heat, found to be soluble in 80 to 95% Ethyl and Methyl Alcohol. The solution protected animals from scurvy. Being insoluble in Butyl Alcohol, Petroleum Ether, Acetone, Ether, Chloroform and Ethyl Acetate indicates that the Vitamin is neither a fat nor a lipin.—E. B. Hart and Co-workers, Jl. Biol. Chem., 1922, per T.D.B. 20/23,398.

Antiscorbutic value of Oriental fruits and vegetables. As a result of experiments on guinea-pigs, pomelo, cucumber, chico and guava were found to afford the best protection from scurvy.—H. Embrey, Jl. Trop. Med., May 1/23, 144.

Strawberry Extractive for use in sprue.—See p. 830.

Bywaters has shown that there are present in the soil bodies which may be called *auximones*—of the nature of Vitamins. It has been seen for example that two adjoining fields differ markedly on fattening power on animals—in one it is assumed Vitamins are wanting.—J. S. White, P.J. ii./16,4.

Emulsio Olei Arachis cum Glucose. Gt. Orm. H.

Peanut Oil 15, Saccharated Lime Solution 4, Gum Acacia 2½, Oil of Cassia 1/40, Oil of Cloves 1/40, Chloroform 1/10, Liquid Glucose 30, Decoction of Irish Moss to 60.

Butol Emulsion V.H.C.

An emulsion of fats and oils (Beef Dripping, Cod Liver Oil, Arachis Oil and Butter) with Glucose and 5% Cane Sugar—with or without Dextrin, using Irish Moss to suspend. Employed for feeding of children.

Confectio Vitelli, Cerevisiæ Fermenti et Limonis Succi Recentis.

Syn. ***Omnevit.** (T.M. 404925.) *Martindale.*

Dose.—½ teaspoonful increased as required.

A preparation containing these three constituents would appear to embody the three 'factors' to the best advantage.

'University Cream' *Syn.* EMULSIO SEVI, U.C.H. Beef suet 40 ozs., Arachis Oil 5 ozs., Syrup 25 ounces, Benzoic Acid 35 grains, Decoction of Irish Moss 70 ozs., water to 1 gallon. Melt the suet, add the oil and the Benzoic Acid. Heat the Moss Decoction to about 60° C., place in an emulsifier and add the fats at about the same temperature. Finally add the syrup and water. This keeps well and mixes well with milk.—C. H. Hampshire and G. E. G. Hawker., B.P.Conf., 1919.

For use instead of cow's cream in preparing infants' feeds.

It supersedes '**Marylebone Cream.**'—See Eric Pritchard.—L.i./20, 607.

***Vitmar** (T.M. 389337). *Dose.*—An eggspoonful after meals every day. Described as a food containing the Fat Soluble (A) growth promoting, Water Soluble (B) antineurotic, Water Soluble (C) antiscorbutic Vitamines, suitable for backward and delicate children. The fat soluble portion is emulsified. It is stated to have a food value of 400 calories per 100 Gm.

***Vitamogen** (T.M. 363554). A food stated to be a means of supplying Vitamines readily taken which does not upset digestion for children and adults. In nervous affections, dyspepsia and malnutrition.

Mineral Matter 7·5%, Protein content 24·96%, Sugar 20·83%, Starch 26·25%, Fat 1·51%, Cellulose or Fibre 11·95%, gives a marked response for active enzymes.—L. i./17,381.

Metagen is stated to contain the three principal Vitamins, physiologically tested.

A useful DIET SCALE. Equivalents of foods, (Carbohydrates, proteins and fats). An ounce of Carbohydrates or protein yields 120 calories, and an ounce of fat yields 270 calories.—H. S. Pemberton, B.M.J. i./23,680.

ℙ1 NUX VOMICA (*Off.*).

ℙ1 *and all preparations containing* 0·2% *or more of Strychnine.*

Antidotes. *See* **Strychnine.**

Dose.—1 to 4 grains (**0·06 to 0·25 Gm.**) in powder. FR. CX. (*vide infra*) approximates latter as a maximum dose during 24 hours.

The dried ripe seeds of *Strychnos Nux-vomica* (*Loganiaceæ*), imported from India and Ceylon, contain from 0·7 to 1·5% of Strychnine. *Off.* requires the drug in powder to be adjusted to 1·25% Strychnine.

A minute quantity of copper is said to be present in the seeds, and this may colour mixtures made with Tinctures of Nux Vomica and Sal Volatile a bluish green shade. FR CX. requires not less than 2, nor more than 3% (combined) alkaloids.

For further details on Assay of Nux Vomica see Vol. II.

Flavoring for Nux Vomica preparations, see Strychnine.

Uses.—A bitter stomachic and tonic. Stimulates the bowels, hence added to aperients. Increases nervous energy. Given to relieve shock and collapse from anæsthetics. Is employed in dyspepsia, heart weakness, and as a general tonic in all conditions of debility and neurasthenia. For the aged, this and Strychnine have been described as the only suitable bitter tonics.

In phosphaturia, small doses of Nux Vomica and of Diluted Hydrochloric Acid are often of great service.—Tirard Med. Treatment.

℞ **Extractum Nucis Vomicæ ('Siccum')** (*Off.*).

Dose.—¼ to 1 grain (**0·016 to 0·06 Gm.**).

Contains 5% of Strychnine, now adjusted with Calcium Phosphate *vice* milk sugar.

F.I. prepares with Alcohol 70% and alkaloidal strength 15%; this refers to total Alkaloids, and is unsatisfactory. FR. CX. conforms with F.I. making the preparation 16% total alkaloids, with *max. single dose* ⅝ grain and max. in 24 hours 1½ grains approx. U.S. IX. practically agrees with F.I. Nux Vomica Extract elsewhere abroad is called **Extractum Strychni.**

℞ **Extractum Nucis Vomicæ Liquidum** (*Off.*).

Dose.—1 to 3 minims (**0·06 to 0·2 Cc.**).

Prepared by re-percolating the seeds in powder with Alcohol 70% (60% is adequate and it leaves the fat behind), defatting with Hard Paraffin, and adjusting the strength so that the extract contains 1·5% of Strychnine.

℞ **Fluidextractum Nucis Vomicæ.** U.S. IX. is hydro-alcoholic and is assayed to approx. 2·5% total alkaloids. *Average dose.*—1 minim.

℗ **Tinctura Nucis Vomicæ** (*Off.*).

Dose.—5 to 15 minims (**0·3 to 1 Cc.**), often less.

This contains 0·125% of strychnine, and is made on the lines of B.P. '98. One ounce contains about ½ grain of strychnine, or about half the quantity in the Tincture of B.P. '98, and the same strength as B.P. '85. It now = approx. F.I.

FR. CX. prepares by dissolving 1·562 Gm. Extract (FR. CX.) in Alcohol 70% *q.s.* to produce 100 Gm. This contains 0·25% combined alkaloids (F.I.) Max. single *dose*, 19 minims. Max. during 24 hours 95 minims approximately, U.S. IX. is a 1 in 10 Tincture adjusted to 0·25% Alkaloids (Total).

℞ **Tablets** equal 5 and 10 minims of the tincture.

Varicose veins have been treated with an application containing Nux Vomica. The legs to be rubbed very lightly from top to bottom, night and morning, with a piece of flannel soaked in an application composed of Nux Vomica Tincture 5, Hamamelis Tincture 4, Eau de Cologne to 100.

Each morning the patient to take a bath of 20 minutes' duration in water at 35° C. (95° F.) in which 500 Gm. (17½ ounces avoir.) sodium bicarbonate has been dissolved. The bath to be followed by a rest of half an hour.—Pres.

℗Tinctura Ignatiæ.

Dose.—3 to 20 minims (0·2 to 1·2 Cc.).

From St. Ignatius' Beans, the seeds of *Strychnos Ignatii* (*Loganiaceæ*) (containing about 1½% Strychnine and 1% Brucine)* 1 part, and a mixture of 90% Alcohol 3 and Water 1, *q.s.* to produce 10 parts. A preparation known as ℙ1 **Gouttes Amères de Baumé** (Fr. Cx.), is of strength 1 in 5. *Max. single dose* 4 minims. Max during 24 hours 30 minims approximately.

OLEA ESSENTIALIA.

The various essential oils used in medicine, prepared either by distillation or expression or a combination of the two, are dealt with under their respective headings.

For processes of Assay of Essential oils see Vol. II.

Antiseptic Powers of certain Essential Oils.

The Carbolic Coefficients obtained by us under certain conditions (*vide Vol. II.*), for Essential Oils, show that several possess considerable antiseptic power. For example, Origanum Oil (containing over 80% Phenols, *e.g.*, Carvacrol), had almost the same coefficient as Thymol—an acknowledged excellent antiseptic, viz., 25 to 26. Following these came Oil of Thyme containing less Phenols, then Geraniol, Cinnamon Oils, Clove Oil, and so on in this order.

As an outcome of our investigations Saponaceous Solutions of some of the Essential Oils are prepared for physicians' use under the name—

Perfumed Formosyls as follows :

Almond.	Eucalyptus (Globulus).	Otto of Roses.
Cassia.	Geranium.	Rosemary.
Cinnamon.	Lavender.	Thyme.
Citronella.	Lemon.	Wintergreen.
Eucalyptus (Amygdalina).	Origanum.	

Uses.—For disinfection of the hands and skin. A tablespoonful to be poured in the palm of the hand and well rubbed and lathered with an equal quantity of water for two minutes. For treatment of skin affections local use as paints or lotions is suggested. (Individual preference as to aroma may be taken into account).

The strength of these Perfumed Formosyls is so arranged that when using any of them as directed above the suggested quantity contains sufficient Essential Oil to act as an efficient bactericide—indeed, an excess is present—in the light of knowledge which we have obtained comparatively with Carbolic Acid.

Terpeneless and Sesquiterpeneless Essential Oils are described in *Vol. II.*

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* Fr. Cx. requires about 2·5% combined alkaloids. *Max. single dose* of the powdered Beans 1½ grains, *Max.* during 24 hours 5 grains approx.

OLEATA.

Acidum Oleicum. U.S. **P. Jap**

$CH_3(CH_2)_7CH : CH(CH_2)_7COOH = 282{\cdot}362$.

A pale-sherry coloured faintly acid oily liquid (at ordinary temperatures) with a slight odour. ***Solubility,*** readily in 90% alcohol, ether, chloroform, benzol, and fixed oils : insoluble in water ; it dissolves most metallic oxides, thus forming indefinite oleic solutions of oleates in an excess of Oleic Acid ; such combinations of bismuth, copper, lead, mercury, and zinc are used medicinally ; they are soluble in fats. Mercuric Oleate made this way is better than the B.P. '98. Oleic Acid also dissolves alkaloids, but not their salts, *e.g.*, Oleate of Aconitine, Oleate of Atropine (2½% perfumed with Otto), Oleate of Morphine and Oleate of Veratrine are used medicinally. Oleic Acid is much more readily absorbed by the skin than oils. It also aids the absorption of drugs with which it is combined.

The splitting up of Oleic Acid into Pelargonic and Azelaic Acid shows position of the double link.

$$C_8H_{17}CH : CH.C_7H_{14}.COOH + 2O_2 = C_8H_{17}COOH + COOH.C_7H_{14}COOH.$$

Pelargonic Acid. Azelaic Acid.

Conversion of Unsaturated Fatty Acids into Saturated, *e.g.*, Oleic into Stearic Acid—$C_{18}H_{34}O_2 + H_2 = C_{18}H_{36}O_2$. This achievement—a matter of great importance in the Oil industry—has been effected by bringing the Hydrogen and the liquid fat together at high temperatures in the presence of finely divided Nickel (or Cobalt, Platinum, etc.) as catalytic agent. The products are used both for food and for soap making.—P.J. i./13,97.

Pharmacology.—Subcutaneous injections of Oleic Acid Soaps cause anæmia.—A. E. Boycott, B.M.J. ii./10,1420.

Sodium Oleate, *inter alia*, increases the action of **lipase** *in vivo* and *in vitro*. —J. A. Shaw Mackenzie. See further under Sodii Oleas.

To prepare pure Metallic Oleates—Caspari recommends the preparation of (*a*) Sodium Oleate and (*b*) Potassium Oleate Solutions in place of ordinary Soap solutions. (*a*) Warm 1,217 grains Oleic Acid to 60° C. and add slowly 192 grains Sodium Hydroxide (90%) dissolved in a mixture of 2 ounces Distilled Water and 6 drachms of Alcohol, stirring constantly until acid neutralised (use Phenolphthalein Solution). Dissolve finally in 3 pints of water and filter. (*b*) Neutralise 410 grains Potassium Bicarbonate with 1,156 grains Oleic Acid in 1 pint of water by boiling. When cold make up to 3 pints. To the Solution (*a*) add Lead Acetate crystallised 819 grains, Copper Sulphate 540 grains. Zinc Sulphate 621 grains, Mercuric Nitrate 711 grains, or to (*b*) Lead Acetate crystallised 777 grains, Copper Sulphate 510 grains, Zinc Sulphate 591 grains, or Mercuric Nitrate 675 grains, each dissolved in 1½ pints of water to produce the corresponding pure Oleates.

Capsules of Oleic Acid, 7½ minims. *Dose.*—One or two daily.

These are given for hepatic colic, and to hinder the formation of gall stones. Best taken in the morning on an empty stomach.

℗ ℙ1 Oleanodyne.

A special preparation combining the alkaloids aconitine, atropine, morphine (0·3%), and veratrine, with oleic acid. It is rapidly absorbed, and forms a strong anodyne liniment, which can be diluted with chloroform, alcohol, or oils. It is not so compatible with compound camphor or soap liniment.

Cupri Oleas, Copper Oleate.

$(C_{17}H_{33}COO)_2Cu = 626{\cdot}278$. (Theoretical formula for Pure Oleate.)

Add a hot solution of copper sulphate 3 in 8 of water to a hot solution of Castile Soap 8 in 32 and wash and dry the precipitate. When

cold it is in solid dark-green masses. It is an oleo-palmitate of copper, containing copper equivalent to about 10% Cupric Oxide. Soluble in ether.

Unguentum Cupri Oleatis.

Copper Oleate 12, Yellow Soft Paraffin 88. Melt together. For some purposes it may be employed half strength.

Is specially useful in ringworm—lightly rubbed in night and morning,—for indolent ulcers, warts and corns, and has been used to remove freckles.

Bougies of Copper Oleate are prepared 4 inches long containing each 5 grains (0·3 Gm.) Copper Oleate with Theobroma basis. For treatment of malignant disease. These bougies are useful adjuvants to the Sodium Coumarate treatment, reaction to treatment being more readily obtained with their aid.—L. Drage.

Ovules of Copper Oleate, with Cacao Butter basis contain 5 grains Copper Oleate. Used in the treatment of malignant disease (Drage). These have been found of value in uterine and vaginal cancer in conjunction with the *Coumaric treatment, q.v.*

Ⓟ **Emplastrum Cupri Oleatis** contains 20% of Copper Oleate made with Soap Plaster spread on Adhesive Plaster. Employed as adjuvant to the palliative *Coumaric Treatment, q.v.*, of malignant disease of breast, rectum, &c.

Hydrargyri Oleas. **Mercuric Oleate.** *Off.* 20% Oxide.

The 1898 B.P. method was intended to produce normal Oleate, but it did not work well. That of *B.P.* 1885 by acting on Mercuric Oxide with Oleic Acid is now re-adopted, using slight warmth, (B.P. '85 was 10%).

Unguentum Hydrargyri Oleatis (*Off.* and B.P. 1898).

Mercuric Oleate 1. Benzoated Lard 3.

'**Capsungs**' of this ointment are prepared containing ½ drachm in each for inunction.

℔ ℙ1 **Oleatum Hydrargyri** (10%) **cum Morphina.**

Morphine (base) 1, is dissolved in 60 of the above. Linimentum Hydrargyri Oleatis cum Morphina, R.O.H., is similar. For use where the plain Oleate causes pain.

Oleatum Hydrargyri Liquidum, 5%.

Is prepared with one half as much oxide as the 10% and when ordered with morphine, 1 part is added to 60 parts of the oleate *when dispensed.* The 10% is always dispensed unless one of the others is specially ordered. They should be applied with a brush without much friction.

Uses of Mercuric Oleate Preparations.—For syphilis in secondary and tertiary stages. The application does not salivate unless used in excessive quantity. In persistent inflammation, especially of glands, and joints (such as synovitis), and in non-ulcerated syphiloderma, the Oleates of Mercury are much more active, definite, and cleanly, than the mercurial ointment. They are very effective

parasiticides for pediculi. Ringworm has been cured by them, but Croton Oil (*q.v.*) is also used and if extensive the X-ray treatment will cure it.

In rheumatoid arthritis the joints thickened by fibrous adhesions and fibroid thickenings of the synovial and periarticular tissues may be treated with Mercuric Oleate with Morphine Hydrochloride ½ grain in 1 drachm added.

Oleatum Hydrargyri cum Sulphure.

Mercuric Oleate 5%, 4, Precipitated Sulphur 1, Ether 3.

For pediculi pubis.

Unguentum Hydrargyri Oleatis Compositum. — BROOKE'S OINTMENT.—Mercuric Oleate Ointment (5%), Compound Zinc Paste (Lassar's Paste) of each 41, Salicylic Acid 6, Ichthyol 12.

In (septic) œdema of the face has been applied covered with cotton wool in thick layer and pressed down by cotton elastic bandage.

Syphilitic Disease of the Nervous System. It is not advisable to give Potassium Iodide and Mercury together in full doses, except in a very urgent case. A drachm of the 10% oleate should be rubbed in near the affected part twice daily for three or four days, and then once daily for remainder of the week; near the scalp if in the brain, and down the back if in the spinal cord: treatment to be brief, to last eight weeks or so, and be renewed after two, four or six months.—Gowers.

℗ **Emplastrum Hydrargyri Stearatis.**

Lead Plaster 6, melt and add **Mercuric Stearate** [$(C_{17}H_{35}COO)_2Hg$=767·34] 2, made by direct combination of Mercuric Oxide 10, with Stearic Acid 26 or *q.s.*—Melt the acid and gradually stir in the oxide until all dissolved—a sand bath may be necessary. Is a substitute for mercurial plaster, and for joints requiring Mercurial treatment, but it is pharmaceutically inelegant.

ℙ1 **Emplastrum Plumbi** (*Off.*). *Syn.* DIACHYLON PLASTER.

ℙ1 *Lead in combination with Oleic Acid or other higher fatty acids, whether sold as Diachylon or under any other designation (except Machine-spread Plasters)—From May 27/17. We have followed the letter of the law by placing* '**Preparations of**' *in* ℗. *Obviously in doubtful cases they should be treated as* ℙ1.

Lead Plaster is a crude Oleate of Lead, made by the combination of olive oil (oleate and palmitate of glyceryl) and oxide of lead heated together in the presence of water. Thus made, the oleate is more adhesive than when prepared by the oleic acid solution of the oxide.

This has been used as an abortifacient in the Midland Counties.

Diachylon Pill poisoning (taken to produce abortion). *Treatment.* Sodium Monosulphite 1/3 grain with Tincture of Cardamoms thrice daily. Recovery. A powerful and dangerous ecbolic.—B.M.J. i./13,1199. Poisoning by: Treatment by potassium iodide, opium and bismuth —B.M.J. i./06,259.

℗ **Emplastrum Resinæ, Adhesive Plaster** (*Off.*).

Is more adhesive than Lead Plaster. ℗ **Emplastrum Saponis** is similar, but less adherent than the latter.

℗ **Emplastrum Adhesivum, U.S., VIII.**

Melt Rubber 20, at not exceeding 150° C. (302° F.), add Petrolatum 20, and heat until rubber is dissolved. Add Lead Plaster 960, and then strain.

The following ointments are prescribed for eczema, excessive perspiration of the feet, &c.

Ⓟ **Unguentum Diachyli.**

Lead plaster 1, Yellow Soft Paraffin, 1.

Melt together and stir till cold. Made thus, the ointment keeps well, and does not acquire a disagreeable odour.

Ⓟ *Unguentum Diachyli Carbolisatum* (Lassar) is the same with 2% of phenol.

To be rubbed in 1 to 3 times a day, or spread on linen and applied as a plaster. **U.S.** has Lead Plaster 50, Soft Paraffin 49, Lavender Oil 1.

Thorii Oleas *v.* Thorium Compounds.

Unguentum Zinci Oleatis (*Off.*).

Precipitated Zinc Oleate (now prepared somewhat differently from B.P. '98) 1, Soft Paraffin, White 1. Melt together and stir till cold. For some cases further dilution with Soft Paraffin is advisable. This ointment will cure chronic eczema.

Zinci Oleas—*Syn.* Zinc Oleo-Stearate. (*Off.*).

$(C_{17}H_{33}COO)_2Zn = 628{\cdot}078$. Theoretical formula for the Oleate.

Manufacture—B.P. 1914 employs a solution of Hard Soap 2, and Curd Soap 1 in Water 15, and adds to it Zinc Sulphate 1 in water 2. This makes a *harder* preparation than the following :—

Hard Soap in shavings 16, Boiling Water 120 ; heat to dissolve. Zinc Sulphate 8, Boiling Water 16 ; dissolve and add to former solution ; stir well, separate the water from the Oleate, and wash the latter with hot water till free from sulphate, cool, and dry. Reduced to powder is useful for dusting on eczematous surfaces and for excessive perspiration. It may be perfumed by the addition of $\frac{1}{500}$ of thymol, and diluted with kaolin or starch.

Ⓟ **Unguentum Oleatorum, G.H.**

Zinc Oleate Ointment, Diachylon Ointment and Mercury Oleate Ointment of each equal parts.

Further Metallic Oleates :—

The following working formulæ are the results of our experiments. Several of these compounds would be well worth therapeutic trial. —*cf.*, G. I. Mackay,—P.J, /i./11,269.

General method of preparation.—

Except where otherwise stated, to 3 pints of the Soap Solution (*a*). (*v.* p. 601) boiling, add slowly with stirring the amounts stated of the salts in 1½ pints of water also boiling, wash precipitate by decanting, and dry. As a general rule it is desirable to have the *solutions of the salts* in slight excess.

Argenti Oleas. Ag. $C_{18}H_{33}O_2 = 389{\cdot}234$.

Dose (suggested).—$\frac{1}{4}$ to $\frac{1}{2}$ grain (**0·016 to 0·03 Gm.**).

Manufacture.—Use Silver Nitrate 740 grains in 1½ pints of water with the general directions, p. 601.

Silver Oleate forms a white powder, becoming dark on exposure.

Soluble—slightly in ether and slightly in alcohol.

Uses.—Should prove useful locally, strengths being guided by corresponding Silver Nitrate preparations (bougies and ointments).

It is stated to have high bactericidal power. It is readily absorbed. May be of use in eye affections (dilute ointments). Its solution in Oleic Acid does not stain the skin (Mackay).

Bismuthi Oleas. $Bi_2O.(C_{18}H_{33}O_2)_4 = 1557{\cdot}416$.

Dose.—5 to 10 grains (**0·3 to 0·6 Gm.**) but larger amounts would be used in X-ray work.

Manufacture.—Dissolve Bismuth Nitrate (cryst.) 960 grains in Glycerin, 40 ounces by weight in the cold. Add to the solution 3 pints of the Sodium Oleate solution (p. 601), wash by decanting, collect and dry. A greyish white unctuous substance.

Soluble with some decomposition slightly in Alcohol and Ether,

Uses.—Should prove useful in place of Subnitrate or Carbonate in X-ray diagnosis : It would not be attacked so readily by the stomach juices. Might be tried instead of other Bismuth compounds, *e.g.* to form a coating on the stomach or intestines in gastric ulcer.

Ferri Oleas. $Fe(C_{18}H_{33}O_2)_3 = 899{\cdot}902$.

Dose.—5 to 15 grains (**0·3 to 1 Gm.**).

Manufacture.—Use Ferric Chloride ($+12\ H_2O$) 790 grains with the general directions, p. 601. A hard reddish brown mass.

Soluble—fairly in ether and very soluble in alcohol.

Gelatin Capsules contain 5 grains.

Uses.—These have been given in anæmia as a succedaneum to Ferrous Carbonate. Should prove of greater value than the Perchloride.

Stanni Oleas. $Sn(C_{18}H_{33}O_2)_4$ (?) $= 1244{\cdot}116$

Dose.—Not used internally.

Manufacture.—Add Stannic Chloride, 566 grains dissolved in the smallest quantity of water to 3 pints of the soap solution (*v.*p.601)

Uses.—Has been employed in diseases of the nails—overcomes brittleness, splitting, etc.—Squire.

Strontii Oleas. $Sr(C_{18}H_{33}O_2)_2 = 650{\cdot}338$.

Dose.—(suggested) 5 to 20 grains (**0·3 to 1·2 Gm.**).

Manufacture.—Use Strontium Nitrate, 470 grains in $1\frac{1}{2}$ pints boiling water with the general directions, pp. 601, 604.

A hard white mass ***soluble*** in ether ; slightly in alcohol.

Uses.—Should possess properties of the Strontium Salts—probably to a less degree and with more prolonged effect.

Barii Oleas. $Ba(C_{18}H_{33}O_2)_2 = 700{\cdot}073$.

Dose.—Not suggested for internal use but as local application in Creams and Ointments in skin affections, with caution as to proportion. The Oleate, a white unctuous substance, as such had no ill effect on healthy skin.

Manufacture.—Use Barium Chloride, 500 grains, with the general directions, pp. 601, 604.

Uranii Oleas. $UO_2(C_{18}H_{33}O_2)_2 = 832{\cdot}908$.

Dose (suggested).—$\frac{1}{2}$ to 5 grains (**0·03 to 0·3 Gm.**).

Manufacture.—Employ Uranium Nitrate 1092 grains with the general directions, pp. 601, 604.

A yellow substance of plastic consistence.

Uses.—Possesses radio-active properties. Suitable for local use to malignant growths and in skin affections as **Unguentum Uranii Oleatis.**—25% strength in Unguentum Lanolini softened if necessary *cf.* **Unguentum Thorii Oleatis.**

Calcii Oleas. $Ca(C_{18}H_{33}O_2)_2 = 602{\cdot}778$.

Dose.—5 to 15 grains (**0·3 to 1 Gm.**).

Manufacture.—Employ Calcium Chloride, 240 grains (fused Anhydrous) with the general directions pp. 601, 604.

A granular mass slightly soluble in Alcohol and Ether.

Uses.—May be representative of other Calcium Salts. This salt of (Unsaturated) Oleic Acid may be tolerated whilst the Palmitate and Stearate when formed as a product in the system are said to be irritating, *c.f.* p. 269. Has recently been used in ' colloidal' form *q.v.*

Magnesii Oleas. $Mg.(C_{18}H_{33}O_2)_2 = 587{\cdot}028$.

Dose.—10 to 30 grains (**0·6 to 2·0 Gm.**).

Manufacture.—Employ Magnesium Sulphate, 540 grains with the general directions, pp. 601, 604. A moderately hard white mass.

Soluble—slightly in Alcohol and more so in Ether.

Uses.—This compound we have found by trials to possess prompt purgative action. 15 grains taken by two individuals had this effect within 3 hours. **Pills** of Magnesium Oleate contain 5 grains each and **Capsules** contain 10 grains.

OLEUM CHAULMOOGRÆ incorrectly termed Oleum Gynocardiæ (I.C. Add.) ; P. Argent. II.

Dose.—5 to 10 minims (**0·3 to 0·6 Cc.**), increased to 1 drachm (**4 Cc.**) in capsules, cod-liver oil, or milk.

The oil (about 33%) expressed from the seeds of *Taraktogenos Kurzii-King.* This is an evergreen shrub growing in Chittagong, Burma, and parts of Assam only.

The fruits yielding genuine Chaulmoogra Oil are distinguished from those of Gynocardia by containing *many* seeds (average 21) packed close together and facetted by mutual pressure, hence no two are the same identical shape, and having no pulp, the embryo is vertical and cordate, while that of Gynocardia is lateral and reniform.

The oil from *Taraktogenos Kurzii* is cold-drawn. It is a yellow oil with an odour of rancid butter and M. Pt. of 22—23° C. The residual cake is valuable for cattle feeding.

Spurious Oils, from the allied **Hydnocarpus Wightiana** or **Asteriastigma Macrocarpa,** growing in South and West India only were on the market a few years ago. These differ in colour, odour, specific gravity and content of Chaulmoogric Acid and have M.pt. 26° C.

Oleum Hydnocarpæ P.J. IV. is obtained from the peeled seeds of Hydnocarpus. At 22 to 23° C. the oil almost completely liquefies and at 25 to 30° C. it melts completely.

Gynocardia Odorata Oil has a brown colour and odour resembling painter's varnish and remains liquid at ordinary temperature down to 4·5° C. It is stated to have no therapeutic value in leprosy.—E. E. Francis, Chief Medical Officer, Assam Bengal Ry., Chittagong. It does not contain Chaulmoogric Acid but consists chiefly of the Glyceryl esters of Linolic and Linolinic Acids.

Uses—The oil is applied externally, and given internally *after meals*, for leprosy, phthisis, scrofula, rheumatism, marasmus, psoriasis, and lupus. The treatment of leprosy with it has to be persisted in for several years. The theory of its action in leprosy seems to be that it increases the number of leucocytes and enhances the bactericidal properties of the blood. Leprosy has also been treated by half-ounce doses per rectum daily. Patients must refrain from salted food such as fish, cheese and vegetables.

For phthisis 2 to 4 ounces should be rubbed into the chest weekly. Applied to raw surfaces, however, causes great pain.

In the knowledge of the writers, a patient suffering from leprosy took over a long period, a large quantity of Chaulmoogra Oil Capsules. The dosage employed was two 15 minim Capsules four times daily, increased. He found that he could take up to 200 minims per diem, but larger quantities had a tendency to make him sick. The spots on the face and hands disappeared almost entirely, but there remained the deadened feeling of the tissues of which there was hope of complete disappearance.

Emulsio Olei Chaulmoograe.

Dose.—½ to 1 drachm (**2 to 4 Gm.**).

We found the following formula satisfactory to produce a liquid Chaulmoogra preparation :—

Chaulmoogra Oil 1 ounce, Poppy Seed Oil 2 ounces, Powdered Gum Acacia ¾ ounce, Cinnamon Oil 6 minims, Saccharin Elixir 45 minims, with Water to make 6 ounces.

Injectio Olei Chaulmoograe Intramuscularis.—*Martindale.*

Dose.—½ to 1 Cc., increased to tolerance.

Chaulmoogra Oil and Almond Oil equal parts, sterilised.

Sterules of this preparation containing **1 and 2 Cc.** of the mixture are made. This preparation would be quite liquid in tropical climates. At room temperature in our laboratories April 1924 it is solid but the warmth of the hand is sufficient to liquefy it. In very cold climates a 33% preparation would be better.

Injectio Olei Chaulmoograe. Heiser's Injection.

Chaulmoogra Oil 60, Camphorated Oil 60, Resorcin 4. Heat on water bath to dissolve and filter. *Dose.*—1 Cc. increased to tolerance. In leprosy said to produce apparent cures or great improvement.

McCoy and Hollman, Public Health Bull, 75, January, 1916, Washington. (L. i./16,790) found the injection of oily preparations of Chaulmoogra badly tolerated—causing abscess, heart failure, etc.—in cases treated at the Hawaii Settlement. (Sodium Chaulmoograte 'C' on the other hand is tolerated).

Spontaneous remissions of leprosy. Spontaneous apparent cures occur. A cure must stand the test of time—five years or more. In South Africa (Robben Island and elsewhere) for advanced nodular stages. Chaulmoogra Oil intramuscularly 3 to 5 Cc. at a time repeated every three days for five months or more, if patient can stand it, is considered the best palliative so far. The purified oil to be given internally in 15 minim capsules.—L. ii./13,1529. *See also Leprosy Bacillus, Vol. II.*, and *Leprosy, a self-healing disease—under Ethyl Esters. And some interesting Notes in the Preface.*

Heiser's method of injections sometimes give rise to disagreeable symptoms. Besides being painful, necrosis at the site of injection and oil-embolism of the lungs have occurred.—W. W. Cadbury per T.D.B., Vol. 17, 1921,279.

Chaulmoogra Oil intravenously in the treatment of leprosy. Preferable to Sodium Gynocardate, Sodium Hydnocardate or Sodium Morrhuate. Tartar Emetic useless. Moogrol intramuscularly too painful, but intravenously better borne than the crude oil—results doubtful. Tuberculin believed to be useless. Report on treatment of 265 cases at Makogai Asylum, Fiji.—Philip. Harper, Jl. Trop. Med., Jan. 1/23,7.

Capsules of Chaulmoogra Oil contain 5, 10 and 20 grains.

Unguentum Chaulmoograæ (*Off.*) *Syn.* UNGUENTUM GYNOCARDIÆ, 10% in Paraffin basis.

Sodii Chaulmoogras, Pure Commercial, from genuine *Taraktogenos Kurzii* Oil.

Dose.—1 to 3 grains (**0·06 to 0·2 Gm.**) thrice daily or to limit of toleration. Our conception is that if, as indeed we believe, there is curative value in Chaulmoogra against leprosy, the drug should be absorbed sufficient to saturate the system and it should be given over a prolonged period. *cf.* abstract of a recent useful paper by E. Muir, pp. 611, 612.

Manufacture.—Saponify genuine *Taraktogenos* oil by boiling with a sufficiency of strong soda lye and throw out the acid with hydrochloric acid. Wash with warm water until the wash liquor is free from acid and convert into the sodium salt.—W. H. M. See also H. C. T. Gardner, P.J. ii./22,154 and note by W. H. M. *Ibid.* 207.

Fractionation of Chaulmoogric Acid into portions.

The acids present in Chaulmoogra Oil are combined as glycerides. The author, with the assistance of the late H. Johnson, Ph. Ch., in 1915—1916, saponified the oil and subdivided the contained acids into two main groups as described below, and was the original introducer of them in the form of their sodium salts, for special purposes in medicine.

The author had special pharmacological researches conducted on these compounds prior to their use in man. Originally there were four fractions chemically examined, termed 'A,' 'B.' 'C' and 'D.' It was decided to group, as being similar, 'A' and 'B' as also 'C' and 'D.' There remain therefore 'A' and 'C' as described below.

Sodium Chaulmoograte "A" *Martindale* comprises the salts of the higher acids with relatively high melting points. This compound salt contains the true Chaulmoograte and Palmitate and homologues, the acids of which have combined melting point of 50° C. approximately. It represents 50–75% of the total.

Sodium Chaulmoograte "C" (*free from Palmitate—Martindale*), comprising the lower acids with relatively low melting points. It contains the lower homologues with combined melting point of 25° C. approximately.

Whilst the "A" salt is not soluble in a proportion to permit of the ready administration of 3 or 4 grain doses, it can be given in pill form. Simultaneously the "C" chaulmoograte, which is readily soluble, has been used hypodermically. In this way the total active constituents of commercial Chaulmoogric Acid are utilised. On the other hand by giving "A" or "C" alone much may be learnt of their relative activities.

Sodium Chaulmoograte "A" *Palmitate Free* is also prepared but its refinement is expensive and in view of the above suggestions relatively unnecessary.

So far as we are aware no pharmacologist has been able to point to the real therapeutically active constituents of Chaulmoogra Oil

and it is possible that a fractionation on these lines may enable us to separate the useful from the inert components. (*cf.*, Theory of Action, p. 607).

Sodium Chaulmoograte "A" Pills and Gelatin Capsules, 1, 2 and 3 grains (**0·06, 0·12 and 0·2 Gm.**). are prepared.

Dose.—One thrice daily after meals or *ad lib.*

Sodium Chaulmoograte "A" Suppositories, 1, 3 and 5 grains (**0·06, 0·2 and 0·3 Gm.**) or more are also made.

Sodium Chaulmoograte "C" Hypodermic Sterules, 1, 2 and 3 grains (**0·06, 0·12 and 0·2 Gm.**).

Dose.—An injection may be given deeply *under* the fat layers—this is stated to reduce reaction—once or twice a week or as found to be tolerated. *Note.*—Warm the Sterule slightly in a little hot water and shake to thoroughly emulsify.

We have had *no* adverse reports on the injection of Sodium Chaulmoograte "C." *cf.* Physiological Expts. *infra.*

The Superintendent of a Leper Asylum informs us privately that the Injection 'C' is much less painful in use than the Chaulmoogra Oil and Camphor Mixture.

References.

Sodium and Potassium Chaulmoograte dissolved in water with addition of ½% Phenol. 1 to 2 grain doses have been given twice a week subcutaneously also Chaulmoogric Acid internally up to 40 grains daily. Anæsthetic cases showed marked diminution of the anæsthesia and return of heat and cold and tactile sensations as well as some gain in muscular power within 2 months. Tubercular leprosy also improved.—Sir L. Rogers, L. i./16,288,374.

Sir L. Rogers working *subsequently* to our own investigations, separated the total acids of Chaulmoogra Oil on lines almost identical with our own, and has communicated a paper on the subject. He expresses the opinion that it is very doubtful if the Chaulmoogric and Palmitic Acid fraction is of any value when given internally. The remaining acids which in his case have melting points 37 to 40° C. give soluble Sodium Salts. These combined Sodium Salts have been given *intravenously* in 2 to 3% solution with promising results—possibly of value also in tuberculosis. The intravenous method is preferred to the subcutaneous. He states that the most striking result is the occurrence of definite local reactions in the diseased tissue—sometimes accompanied by fever which has been seen in several cases after from 2/5 to 3/5 grain intravenously.—B.M.J. ii./16,550.

Physiological Experiments with our Fractions.

We have had the following physiological experiments specially conducted :—

Determination of Toxicity of Sodium Chaulmoograte "C" and comparison of a 2% with a 20% Sodium Chaulmoograte "C" Solution.

Sir L. Rogers it will be noted uses a 2% solution of his soluble fraction and in relatively minute dose. Our preparation we had good reason to believe is better tolerated and the following summarised report justified the view.

Injections were given, isotonised :—

(1) Intravenously without anæsthetic—Rabbits.
(2) ,, under ether—Cats.
(3) Subcutaneously without anæsthetic—Cats.

(1). **Intravenously** using the 20% preparation a rabbit tolerated 0·1 Gm. of Sodium Chaulmoograte "C" per kilo body weight = 6·3 Gm. for a 10 stone man.

Using the 2% preparation a rabbit suffered marked dyspnœa and tremor from 3·15 Gm. calculated for a man, but recovered. A dose in this strength equal to 7·5 Gm. for man, killed the animal in 5 minutes.

(2) **Intravenously** with the 20% preparation a cat survived (with fall of blood pressure and dyspnœa) 0·1 Gm. per kilo body weight = 6·3 Gm. for a man, whilst 0·184 Gm. produced immediate death. (Combined 2 and 20% preparations given separately).

(3) **Subcutaneously** with the 20% preparation 0·15 Gm. had no obvious effect on a cat = 9·5 Gm. for man and with even twice this amount there was only temporary dyspnœa and loss of appetite with recovery.

Conclusion.

As the doses used by Rogers—B.M.J. ii./16,550—seemed so small and we ourselves have knowledge of 3 grains of our "C" fraction being given hypodermically in treatment over lengthy periods, the above results were particularly gratifying—especially as the success of the treatment probably depends on saturating the system with the active Chaulmoogra components.

It is clear from the physiological report that weight for weight—comparing the results on animals with the dosage for man—three grains of our *"C" Fraction* ought *certainly to be tolerated* in either 2 or 20% solution even intravenously but the subcutaneous method would seem preferable.

(*Inferences from comparing doses for animals and man by weight for weight should of course be guarded.*)

Sulphuric Acid Test on "A" and "C" Fractions.

Both 'A' and 'C' Acid fractions give the recognised green colour with Sulphuric Acid common to Chaulmoogra Oil. It is preferable to have the fats in *excess* of the Sulphuric Acid. The 'A' responds with stirring in a minute or two. The 'C' gives it in almost the same time but is not so marked.

Unna's Chaulmoograte Pill.

Contained Sodium Chaulmoograte, Ginger and an aperient.

Magnesii Chaulmoogras. Phineas Abraham employed this compound in leprosy.—B.M.J. ii./92,1111,1198.

Ethyl Esters of Chaulmoogra Fatty Acids. *Syn.* CHAULMARTIN, ✱MOOGROL (T.M. 410850).

Dose.—1 Cc. intramuscularly increased by 1 Cc. at every second or third injection until from 2 to 6 Cc. is reached. Injections are made deeply in the upper and outer quadrant of the gluteal region.

Intravenously, if the above is not tolerated, ½ Cc. increased to 1 Cc. usually once a week.

Manufacture.

Our process is as follows :

Saponify oil and precipitate acids. Dissolve these in an equal weight of ethyl alcohol and pass in gaseous hydrochloric acid while heating under a reflux for 1 hour. Cool, pour into water and wash with sodium carbonate solution. Dissolve oil in ether and dry with anhydrous Sodium Carbonate. Filter, and evaporate the ether.

The following directions have been given :

Chaulmoogra Oil 10 Gm., 95% Ethyl Alcohol 100 Gm., containing 4% Hydrochloric Acid heated under a reflux condenser for 2 hours ; the unused Alcohol recovered by distillation and the remaining liquid poured into warm water. The ethyl esters rise to the top and are decanted off and washed until free from acidity.—Boulay, per Jl. Trop. Med., July 2/23,238.

We found the color of the product made by this method to be reddish brown and the solubility in alcohol to be poor : there is a considerable amount insoluble. We do *not* favor the process.

Characters.—A mobile liquid, almost colorless, with very slight chaulmoogra odour. Sp. Gr. 0·910 to 0·917. Slightly acid (5 Cc. require not more than 0·2 Cc. N/10 NaOH). Saponification value 195 to 200. M.pt. of mixed acids on saponification 40 to 45° C.—these data are according to our own experiments, 1923.

Uses.—It has been claimed that a preparation of this description would be superior for subcutaneous use. H. T. Holman and A. L. Dean (Jl. Cutaneous Dis. June, 1919,367 ; Pres. Feb. 21,86), point to reactions having been caused with subsequent improvement.

As the fatty acids are in part ' unsaturated ' it is possible to add Iodine to them, *e.g.* by the use of Iodine Monochloride.—J. T. McDonald and A. L. Dean, Public Health Rep., U.S.A., Aug. 20,20, p. 1959, reported favorably on the plain and Iodised preparation, but there was *no adequate experimental proof that the addition of Iodine improved effectiveness.* The hypodermic injections into leprous nodules are followed by marked swelling with ultimate recession of the nodules.

The standard preparation used in Honolulu and on Molokai, Hawaii, for weekly injection consists of the ethyl esters of the entire fatty acids of the whole oil chemically **combined with 2% Iodine** by weight. *Dose.*—1 Cc. intramuscularly, increased by 1 Cc. at every 2nd or 3rd injection, until from 2 to 6 Cc. is reached according to age and weight of patient.

For oral use the mixed fatty acids combined with 2·5% Iodine have been given in **Capsule** form. *Dose.*—0·25 Gm. per 100 lbs. body weight, three times a day 1 or 2 hours after meals. This dose is gradually increased every two weeks until a maximum of 1 Gm. per 100 lbs. weight is given. In about two years 78 patients after this treatment were discharged ' on parole.'—J. T. McDonald and A. L. Dean, Jl. Am. M. Ass., May 28/21 ; B.M.J.E. ii./21,5, T.D.B. Vol. 17,21,281. See also F. E. Wood, Jl. Trop. Med., Nov. 1/23,334.

To our minds the chief advantage in a preparation of this kind is that it permits of the simultaneous use of *all* the acids of the oil, both high and low melting in the form of an injection into the tissues, but we are a little in the dark as to why the ethyl esters should be any more suited for the purpose than the Glyceryl Esters, which of course constitute Oleum Chaulmoograe.

Experiments as to absorption.

To us these Ethyl Esters appear to be chemically too stable—little likely to be split up and absorbed. We treated the compound with physiological alkali for 24 hours at 40° C. It was scarcely affected and even with 2% Sodium Hydroxide only a very dilute amount is hydrolised. We admit that enzyme action may come into play *in vivo.*

Rogers has found the Ethyl Esters of Chaulmoogra fatty acids to be too irritating but hopes to do better with Ethyl Morrhuate.—Ind. M.G. Apl./20, p. 125. Further refs.—Pres. Feb./21,88.

The efficacy of Chaulmoogra in leprosy lies, apparently, not in the use of the Ethyl Ester, but in that of the whole oil, preferably in conjunction with Pyrogallol Oxide.—T. C. Ghosh, L. i./23,630.

Leprosy, a self-healing disease.

Comparison with the well-known self-healing diseases—lobar pneumonia, enteric and small-pox. In these latter there is a short incubation period, rapid onset and rise to a climax when immunity has become sufficient to cause more or less rapid diminution and disappearance of the disease, the whole course being finished within a comparatively few days. In leprosy there is a similar process spread over as many *years.* Treatment has to depend on stages of the disease.

In the first stage the disease is present in limited form, with few bacilli in the body, little or no acquired immunity and either dimin.

ished general resistance (temporary or permanent) or the presence of some other condition which is favourable to the increase of the disease. Diagnose and remove whatever diseased condition, environment or unsuitable diet is lowering tissue resistance. Induce immunity by injection of antigens. Defatted acid-fast antigens may be useful. Destroy the bacilli by injections of fatty acids—**the esters of the fatty acids of hydnocarpus** and **chaulmoogra oils** specially useful. Counter irritation by infiltrating esters into the subcutaneous tissue under skin and nerve lesions, or by external use of 1 to 3% **Trichloracetic Acid** painted on to lesions every 6 or 10 days.

In the second stage—the same remedies, but with care. The bacilli are plentiful and there is danger, in the absence of acquired immunity, of further dissemination.

In the third stage. Where a fair degree of immunity has occurred all the above forms of treatment should be pressed. When large injections of the esters do not produce sufficient reaction give *Potassium Iodide*, beginning with ½ grain a day and working to limit of tolerance.—Ernest Muir, L. i./24,277.

Chaulmoogric Acid 'C' Injection. *Martindale.*

Arising out of this recent work we put forward the suggestion to employ our low melting acid fraction as such or indeed *total* acids without neutralising or reconverting into esters. These preparations should prove reactive and, experience suggests, not too reactive in this obstinate infection.

Suggested Dose.—A 5% solution in Almond Oil of our 'C' fraction forms a slightly opalescent liquid without actually separating. *Doses* of 0·05 to 0·2 Gm. in the diluent mentioned would be worthy of trial.

General References.

Leprosy lesions tended to clear up under Sodium Gynocardate. L. Rogers found severe reactions from even 0·2 Cc. of 3% solution.—L. i./21,1178; B.M.J. i./21,640. See also Pr. Aug. '21,77.

Sodium Gynocardate intravenously has been disappointing, but Sodium Morrhuate, besides giving less severe local reactions, has led to definite improvement after 2 or 3 injections only.—W. W. Cadbury, per T.D.B., Vol. 17/21,279.

Chaulmoogric Acid has been stated to have the composition $C_{18}H_{32}O_2$ and Hydnocarpic Acid (previously called **Gynocardic**) $C_{16}H_{28}O_2$ (Dean and Wrenshall). If these formulæ are correct (see B.M.J. ref. for graphic) the acids are unique, for no other fatty acids with similar five carbon rings are known. They are both constituents of Chaulmoogra Oil. Dean was of opinion that Hydnocarpic Acid was more efficacious than Chaulmoogric Acid and that probably the acids with lowest boiling point were most effective. Walker and Sweeney found the acids specific against acid-fast bacilli.—B.M.J. ii./21 851.

Chaulmoogra Oil given per rectum in cases where it was not tolerated by the mouth. The lower bowel should first be well washed out.—L. Stevenel, per T.D.B., Vol. 17/21,279, *ibid* Vol. 14/408.

Experiments on bactericidal values of Sodium Chaulmoograte and Sodium Morrhuate. The former failed to exercise an antiseptic action on organisms of the B. coli group but killed the bacteria of rat leprosy up to a dilution of 1—75,000. The inhibition of the growth of B. tuberculosis was carried out by concentrations of 1—10,000 to 1—20,000.—E. L. Walker and M. A. Sweeney, per T.D.B., Vol. 17/21,277.

For Calcium in Leprosy see Therap. Index—Leprosy.

Chaulmoogra Oil stated to contain bactericidal substances (the acids)about 100 times more active than Phenol.—Jl. Infec. Dis., Mar./20,238; B.M.J. ii./21,851; Pres. Feb./21,86.

Sodium Gynocardate intravenously gave good result in the Philippine Islands.—B.M.J. i./22,240.

Antileprol (a purified form of Chaulmoogra Oil) gives best results in treatment of leprosy.—J. Huntley Peck, Col. Med. Reports, Jl. Trop. Med., Oct. 16/22,77.

Leprosy at Makogai Asylum, Fiji, treated by a variety of methods. Chaulmoogra Oil certainly does ameliorate most cases and cure some.—P. Harper, B.M.J. ii./22,39.

Leprosy. 25% of cases cured and other cases greatly improved in treatment of 120 patients with Sodium Gynocardate and Ethyl Esters of Chaulmoogra Oil.—D. J. Maxwell, Jl. Trop. Med., July 2/23,235.

The Kalaw Tree frequently stated to be the historic origin of Chaulmoogra Oil is apparently the Burmese name for Taraktogenos Kurzii.—J. C. Ghosh, L. i./23,630.

Leprosy in Hawaiian Islands. Most prevalent during school age and ost common in male sex. Ethyl Esters of Chaulmoogra Oil of benefit in ost cases.—W. T. Corlett, per Jl. Trop. Med., Jan. 1/23,13.

OLEUM EUCALYPTI.

Dose.—½ to 3 minims (**0·03 to 0·2 Cc.**) on sugar, emulsified, or mixed with olive oil. U.S. *average dose* 8 minims.

Eucalyptus Oil is distilled from the leaves of numerous species of Eucalypti. *Off.* from E. Globulus, E. dumosa and other species.). The oils which contain the greatest percentage of Eucalyptol are used chiefly for pharmaceutical purposes and the species now being distilled for oils of this class are *E. Polybractea, E. Cneorifolia, E. Odorata, E. Smithii, E. Globulus, E. Australiana, E. Oleosa,* and a few others. As the yield of oil varies greatly with the several species this is a controlling factor. The rectified oils of *E. Polybractea* and *E. Australiana,* are water white, those of the other species mentioned are tinged slightly yellow when freshly distilled. This peculiarity is due to the phenols differing in the two chief groups. Oils which contain as much as 70 to 80 per cent. Eucalyptol are now well known, *e.g., E. Polybractea, E. Smithii,* etc. and have a pleasant, fragrant smell. The oil from *E. Citriodora* has an odour resembling Lemon-grass. We are much indebted to Mr. George Inglis Hudson, of Glebe, Sydney, Australia, for assistance in bringing the above information up to date, and in particular for sending us the papers of Mr. H. G. Smith who has done so much useful research in Eucalyptus Oils.

The oil from *Eucalyptus Smithii* distilled by steam is one of the richest in Eucalyptol content (up to 85%) of all Eucalyptus species examined. The terpene is dextrorotatory pinene; and the yield is also good—20 to 26 lbs. from the leaves and branchlets that can be packed in a 400 gallon tank. The volatile cough-producing aldehydes so objectionable in the oils of many species yielding a cineol-pinene product seem to be largely absent from this oil. Shaking with very dilute Sulphuric Acid and afterwards washing and treatment with Sodium Carbonate removes impurities (iron from tank). It is an excellent species from the cultural point of view.—H G. Smith, Jl. Proc. Roy. Soc., N.S. Wales, XLIX (1915).

See also "The Botanical and Chemical Characters of the Eucalypts and their Correlation." British Association Meeting, Section B. Manchester, 1915.

(*Off.*). requires at least 55% Eucalyptol. The oil ozonizes the atmosphere whilst oxidising. The pinenes contained have the principal action in this direction. B.pt. between 338° and 392° F.; Sp. Gr. 0·910 to 0·930. It should not cause much coughing when inhaled—absence of volatile aldehydes. The unpleasant penetrating and irritating odour of the crude oils is occasioned by different aldehydes, especially valeric aldehyde. *Further information Vol. II.*

Soluble in oils, fats, paraffins, about 3 in 1 of 90% alcohol, in about 3 to 5 vols. of 70% alcohol (*Off.* states, 5 vols.), and in all proportions in absolute alcohol.

Uses.—Antiseptic, a popular prophylactic, inhaled or sprayed for influenza and bronchial catarrh. Useful mixed with an equal quantity of olive oil as a rubefacient for rheumatism.

Scarlet Fever has been treated by inunction of the Oil over the entire body but it is of doubtful efficacy.

In cholera epidemics Eucalyptus Oil 10 minims twice daily has a definite prophylactic effect.—Brooke, 166.

In measles, **Milne's Method** was to rub Eucalyptus Oil all over the body excepting face and hands, morning and night for the first four days, afterwards once a day until the tenth day. Tonsils and pharynx to be swabbed with 10% Carbolic Oil every two hours for first 24 hours or irrigate mouth and throat daily with weak Alum Lotion and Glycerin of Borax applied to interior of mouth and to the gums. Mortality lowered.

Typhoid fever has been treated by 10 minim doses of Eucalyptus Oil. The oil must contain a sufficiency of ozone due to oxidation of the terpenes—or with advantage a little hydrogen peroxide may be added. There is a marked reduction in temperature.

Ankylostomiasis has been treated with good results by Eucalyptus Oil. Two formulæ (i.) weak—Eucalyptus Oil 2 Gm., Chloroform 3 Gm., Castor Oil 40 Gm. (ii.) strong—Eucalyptus Oil 2·5 Gm., Chloroform 3·5 Gm., Castor Oil 40 Gm. *Dose.*—¼ to ½ of either according to age and condition of patient. Also successful for tapeworm and threadworm, but we doubt if specific—see Ol. Chenopodii.

Colds may be treated by steam inhalation with the oil, also internally 10–15 minims on sugar every 3 or 4 hours. See also Oleum Cinnamomi.

Poisoning effects from 1 to 6 drachms are recorded. Effects were gastro-intestinal irritation and cerebral paresis with vomiting and diarrhœa. Treatment by external stimulation, as on the lines of Opium poisoning.

Eucalyptol, U.S., Fr. Cx., F.E.—*Syn.* Cineol; Cajuputol.

$C_{10}H_{18}O$=154·194. *Dose.*—1 to 4 minims (0·06 to 0·25 Cc.).

Is that portion of eucalyptus oil which passes over between 347° and 351° F., and crystallizes at 30° F. It is preferred to the crude oil for use in the oro-nasal inhalers, as it does not dry up as a varnish. It may be obtained from the oil by the action of phosphoric acid (Faulding's Process), with which it forms a crystalline compound.

Eucalyptol Phoshate. On addition of water, this splits up setting free Eucalyptol. It is however not difficult to prepare Eucalyptol by **Freezing.** The Eucalyptol made by the cooling process is of absolute purity. Pure Eucalyptol is optically inactive.—G. I. Hudson.

Tinctura Eucalypti (Foliorum), B.P.C.

Dose.—15 minims to 2 drachms.

Eucalyptus leaves in No. 20 powder in alcohol 60% 1 in 5.

Hæmorrhage from superficial wounds is stated to be capable of arrest by internal use of calcium chloride combined with local application of this tincture.

Sterules, Hypodermic, of **Eucalyptus Oil,** 5 minims with **Olive Oil** 12 minims. This injection into the buttocks for bronchitis has given good results. May be increased to Eucalyptus Oil 10 minims, Olive Oil 5 minims.—A French prescription.

Pigmentum Olei Eucalypti et Acidi Salicylici.

Eucalyptus Oil 8, Salicylic Acid 1, Olive Oil to 64.

Eczema capitis has been cured by this preparation, rubbed into the scalp twice a week. Success attributed to the Eucalyptus Oil. The disease had spread behind the ears and fissures had developed —both meatuses were attacked. The ears were syringed with Carbolic Lotion 1 in 80 and the Eucalyptus Oil applied to the meatus on a pledget of cotton.

Unguentum Eucalypti et Acidi Borici.

Eucalyptus Oil 40, Boric Acid 120, Soft Petroleum to 500. Lessens secretions of rhinitis. 'High Melting' Vaseline is preferable in hot weather.

Vapor Eucalypti, T.H.

Eucalyptus Oil 20 minims, Light Magnesium Carbonate 10 grains, Water to 1 ounce. A teaspoonful in a pint of hot water. **(Vic. Park** has double quantity of oil.)

Vapor Eucalypti Compositus, R.F.H.

Eucalyptus Oil 2, Compound Tincture of Benzoin 3, Thymol 1. Spirit of Chloroform to 8. 10 drops at a time to be inhaled through an inhaler, *e.g.*, the 'Ozonic.'

Nebula Eucalypti Composita.

Form A.—Eucalyptus Oil 5 minims, Cinnamon Oil 2 minims, Menthol 12 grains, Liquid Paraffin containing 2% Aristol to 1 ounce. A small quantity sprayed into the nostrils at bed time, and occasionally afterwards if suffering, is said to be a cure for a common cold.

Form B.—Eucalyptus Oil 5 minims, Wintergreen Oil 5 minims, Menthol 5 grains, Liquid Paraffin to 1 ounce.

***Eumenthol** (T.M. 297687) **Jujubes (Hudson).**

Contain the active constituents of *E. Polybractea* Oil, *Thymus Vulgaris, Pinus Sylvestris, Mentha Arvensis* with Benzo-borate of Sodium. Antiseptic and effective.

OLEUM MORRHUÆ.

Syn. **Oleum Jecoris Aselli.**

French—*Huile de Foie de Morue.* German—*Lebertran*

P. Ital.—*Olio di Fegato di Merluzzo.*

Dose.—1 to 4 drachms **(4 to 15 Cc.).**

The oil (*Off.*) is separated from the livers of codfish, *Gadus Morrhua* (*Teleostei*), by means of steam at a temperature not exceeding 85° C. It is then cooled to a temperature of about—5° C. and the liquid portion, producing the "non-freezing" oil of commerce, is pressed through canvas. Inferior brands are prepared by heating.

For further detail of Characters and Test, see Vol. II.

Soluble.—1 in 2 of Ether, slightly in Absolute Alcohol.

Flavoring.—Syl Lavandulæ, Glyl Pini, or as Emulsion.

The following mixtures of essential oils have been suggested for the purpose: Oleum Amygdalæ Essentiale 2½, Oleum Cinnamomi 7½, Oleum Limonis 16. Further, Oleum Amygdalæ Essentiale 4, Oleum Gaultheriæ 2½, Oleum Cinnamomi 6½, Oleum Myristicæ 2½, Chloroform 5½.—P.J. ii./09,758.

To cover the taste may be taken with a little salt, Worcester Sauce, in steel or orange wine, coffee or milk.

Uses. –Nutritive, nervine tonic given in rickets, phthisis, chronic bronchitis, general debility and malnutrition.

In tuberculosis the **value of Cod Liver Oil**, according to the theory of the late O. T. Williams and others, depends on the fact that the liver has the power of decomposing fats and yielding to the blood **'unsaturated' fatty acids.** These have chemically a loose double linkage and are capable of exerting chemical action more markedly. Fish, particularly Cod Liver, and vegetable oils are richer in these constituents than animal oils. The effects of Cod Liver Oil on the acid-fast properties of the tubercle bacillus showed that the oil had attacked the waxy coating of the bacillus and rendered it, after several months, non-stainable by the usual methods.

'An increase in the amount of unsaturated fatty acids in the environment of the bacillus tends to disintegrate it.' It is assumed, from analogy with animal experiments, that an increase of unsaturated fatty foods yields an increase of the same in the blood, and that the tubercle bacillus is present in the blood in comparatively early cases of phthisis. Increase of saturated fat above a certain point retards its absorption from the intestine. The saturated fat is assimilated up to about 14% only. Unsaturated, on the other hand is absorbed to extent of 98%. In mixed diet the unsaturated help the saturated to become absorbed. The highly **Unsaturated Acids** contained serve the immediate *needs of energy* production and the *saturated* are stored in the nature of a reserve. Cod Liver Oil is composed almost entirely of unsaturated fats.

It may be well to remind non-chemical readers that the saturated fatty acids are those in which all the valencies of the Carbon atom are fully satisfied, as, for example, in Acetic Acid—the first of the series containing Palmitic and Stearic Acids. The **Unsaturated Acids** have some of the Carbon Valencies unattached to other elements and hence have double bonds, thus C=C, *e.g.*, Acrylic Acid—the first of the series containing **Oleic Acid.**

The Oil should be prepared under conditions preventing oxidation, both from the aspect of this theory and the newer **Vitamin** views.

Cod Liver Oil is a food—*it enters into permanent combination with a body cell* yielding energy to it and altering the whole of the cell's relations by becoming an integral part of the cell protoplasm. It is more readily absorbed than other fats and has probably a marked action on metabolism.

The greater part of the fat obtained from animal tissues is not real fat, but to a great extent complex combinations of fatty acids with Glycerophosphoric Acid and Nitrogen-containing compounds—the so-called **Phosphatides**—this is the portion actually made use of by living cells. Phthisical patients treated with Cod Liver Oil have been observed and effects on *Nitrogen metabolism* found to be marked and the beneficial effect on *fat absorption* was also considerable.

Cod Liver Oil is normally digested and absorbed before it reaches the lower bowel, hence it is not a laxative.—E. Pritchard, B.M.J. i./15,489.

Crude Cod Liver Oil, extracted with as little heat as possible and not refined, has a definite inhibitory and bactericidal action on virulent tubercle bacilli. The action was more potent than that given with the refined oil of commerce. Cotton-seed Oil was used as a control.—H. B. Campbell and J. Kieffer, per P.J. i./23,573.

Accessory Food Factor.—This and other Fish Oils are rich in 'Fat-soluble 'A' Vitamin—*cf.* **Vitamins.**

In trypanosomiasis has been reported on (in conjunction with organic arsenic) favourably. Should be tried in a large number of cases.—Bagshawe.

To allay skin irritation Cod Liver Oil 2 mixed with Huile de Cade 1 has been ordered to be applied with a shaving brush.—Ph. Notes.

One of the benefits of Cod Liver Oil in rickets is due to its forming a soluble soap with calcium.—B.M.J. i./11,500. (Subsequently the vitamin content theory had support and *more* recently Cod Liver Oil *plus* Lime).

When a patient is for any reason on a ' + Lime ' diet Cod Liver Oil should be given.—*cf. Digestive Tract*, p. 269.

Capsules of Cod Liver Oil 19 minims **and Creosote** 1 minim are for use in phthisis, also made plain 20 and 30 minims. **Capsules of Cod Liver Oil** (½ drachm) with **Blaud Pill** (4 grains). Ingredients, Sodium Carbonate and Ferrous Sulphate 2 grains each. The Ferrous carbonate in *statu nascendi.*

Emulsio Olei Morrhuæ (50%). **(Martindale).**

Dose.—2 to 8 drachms (**7 to 30 Cc.**).

Soak Irish Moss 2 drachms in Water 12 ounces, six hours, boil and strain off 10 ounces. Allow to cool and add in three portions Cod Liver Oil 12 ounces. Then add Simple Tincture of Benzoin 1 ounce, Alcohol 90% 1 ounce, Essential Oil of Bitter Almonds 10 minims, Elixir of Saccharin 10 minims. This produces a good white preparation.

Ferrated Emulsion of Cod Liver Oil consists of the plain Emulsion with Citrate of Iron and Ammonium 5 grains per ounce.

Emulsion of Cod Liver Oil with Glycerophosphates, *v.* p. 47.

Emulsio Olei Morrhuæ et Hypophosphitum.

Dose.—2 to 8 drachms (**7 to 30 Cc.**). Contains the Hypophosphites of Sodium and Calcium, of each 1%, in the form for **Emulsio Olei Morrhuæ** *antea.* This is a permanent Emulsion. Gum Acacia produces a white Emulsion, but not so permanent.

Emulsio Olei Morrhuæ cum Lecithin is the above with 5 grains of Lecithin per ounce. *Dose.*—2 to 8 drachms (**7 to 30 Cc.**).

The Lecithin is to be incorporated with the above finished Emulsion. Pharmaceutically, it is elegant and palatable.

Note.—We found that 5 grains of Lecithin will only emulsify about ½ drachm of Oil in a formula of this description so that there is insufficient to do this without the aid of Irish Moss.

Emulsio Olei Morrhuæ et Iodoformi.

Consists of the plain Emulsion with ¼ grain of Iodoform added to the dose, *t.d.s.* Was found of benefit in tuberculous affections in children.

Oleum Jecoris cum Iodo. *Syn. Olio di Fegato di Merluzzo Iodato.* P. Ital. Contains 0·05% Iodine dissolved by trituration. To be freshly made.

Oleum Morrhuæ Aromaticum.

Dose.—1 to 4 drachms.

Coumarin 0·01, Saccharin 0·5, Vanillin 0·6, Absolute Alcohol 10·0, Lemon Oil 20·0, Peppermint Oil 3·0, Cod Liver Oil to 1,000. The taste is covered but the odour persists to some extent.

✱ **Oviol** (T.M. 429023). A preparation containing 52% Norwegian Cod Liver Oil with eggs.

Sodium Morrhuate—the sodium salts of the unsaturated fatty acids of Cod Liver Oil after extraction by ether—a 3% solution sterilised with ½% Phenol added;

Dose.—Subcutaneously ½ Cc. slightly increased up to 2 Cc. 2 or 3 times a week until reaction (febrile and local) occurs. When 2 Cc. has been reached give this dose *intravenously* up to 4 Cc.

The theory is that the sodium salts of the unsaturated fatty acids of this and chaulmoogra oil act in some way on the coating of the acid-fast bacilli, the coating of tubercle bacilli having been shown to contain palmitic and other unsaturated fatty acids.—Sir L. Rogers, B.M.J. i./19,147.

Improvement in 2 or 3 cases of leprosy after 2 or 3 injections only of Sodium Morrhuate.—W. W. Cadbury, per T.D.B. 17/21,279.

Two cases of undesirable symptoms with Sodium Morrhuate.—P. Ganguli, Ind. Med. Gaz. 1920, per T.D.B., 17/21,283.

Report of Mission to Lepers. Sodium Morrhuate in treatment of 117 cases gave good results.—Per T.D.B., Vol. 17/21,286.

Animal tuberculosis. Sodium Morrhuate, Soyate and Hydnocarpate of no avail.—Sir L. Rogers, Pr. Aug. 1921, p. 98, but *vide* also B.M.J. ii./23, 1251.

In lupus Sodium Morrhuate hopeful.—Sir L. Rogers, B.M.J. i./21,640.

Cod Liver Oil Substitutes. *See* **Maltolivine**, ***Marrubin** (T.M. 261511, ***Pavimol** (T.M. 362836), **Emulsio Olei Olivæ**, **Syrupus Tann-Iodo-Phosphoratus.**

Dugong Oil from two species of halicore, sebaceous animals inhabiting the rivers and bays of N. and E. Australia may have some value.

G. Watkins, Brisbane, writes he has seen it used externally many times on persons suffering from wasting disease with most beneficial results. Properly prepared it is far superior to Cod Liver Oil. There is, however, a great limit in the production. The calf is three or four years in reaching maturity—only one is produced per year.—C.D. i./13,886

Mutton Bird Oil as a substitute for Cod Liver Oil—the oil of the young Sooty Petrel collected on the Stewart Island south of New Zealand advocated for feeding in phthisis and bronchitis.—J. S. Purdy, B.M.J. i./18,174.

OLEUM OLIVÆ.

Dose.—¼ to 1 ounce (8 to 30 Cc.).

The oil expressed from the ripe fruit of *Olea europæa* (*Oleaceæ*).

Inferior brands are obtained by addition of the pulped fruit to boiling water and by fermentation processes. *For detail of Tests see Vol. II.*

Uses.—Olive Oil is a nutrient and has laxative properties (*vide infra*). Often gives relief to patients who have gall stones. It is frequently used warmed to about 90° F. as rectal injection, as much as 10 ounces at bedtime for constipation. In typhoid ½ ounce doses *per os*, and a breakfast-cupful by the bowel daily gives great relief.

Capsules (Gelatin) of Olive Oil, each containing ½ drachm.

These capsules are also prepared **Formalised (Formagules)** for lubricating the intestines in cases of habitual constipation.

Olive Oil in ½ to 2 ounce doses has been recommended for the treatment of gastric ulcer given by stomach tube if necessary. It is said to inhibit the secretion of hydrochloric acid. Hyperchlorhydria is generally associated with gastric ulcer.—H.

For chronic constipation also gastric ulcer, fissures, hyperacidity and pyloric spasm. Greatly superior to Silver Nitrate or Bismuth and Belladonna. Can be given for long periods and is harmless.—Med. Press, 1917, 154, p. 221 P.J. i./17,275.

Chronic colitis treated with from 8 to 10 ounces of washed Olive Oil, warmed to 100° F., injected per rectum at low pressure and retained all night—injections should be continued nightly for a fortnight.—L.ii./23,1411.

Enema Oleosum L.H.

Olive Oil 4, Soft Soap 1, Warm Water 16.

Emulsio Olei Olivæ. *Dose.*—1 to 2 ounces.

Olive Oil 1 ounce, Gum Acacia Powder 25 grains, Simple Syrup ½ ounce, Water to 4 ounces.

Oleum Olivæ depuratum atque sterilisatum.—Fr. Cx. Wash Olive Oil 100 with Alcohol 95% 30 in a bottle, shaking occasionally; separate the Alcohol and repeat. Then heat the oil for 10 minutes on a sand bath at a temperature not exceeding 115°. Preserve in 50 Cc. sterile bottles.

Maltolivine.

Dose.—2 to 4 drachms (**7 to 14 Cc.**).

A combination of Olive Oil and Malt Extract, as a substitute for Cod Liver Oil. It is palatable and of considerable value as a nutrient in marasmus, rickets, and emaciated and wasting conditions and in colitis of children.

OLEUM PAPAVERIS.

Suggested use of other Oils to replace Cod Liver Oil in malnutrition, phthisis and other forms of wasting disease.

As evidence of the different behaviour of fats in the organism, the late O. T. Williams and G. E. K. Branch found that *only* 2% *of Olive Oil is not absorbed,* whilst with saturated fats, *e.g.*, Stearin, 86 *to* 91% *is not absorbed.* This difference may be accounted for, however, to a certain extent on the basis of melting point of the fat, but there is no doubt that **unsaturated fats** are more easily absorbed, than saturated.

On the content of unsaturated bodies depends the Iodine No. (*cf. Vol. II.*). In reviewing the Iodine Numbers there given for various available oils, it is evident that several nutritive oils, *e.g.*, Poppy Seed Oil, Maize Oil, Soya Bean and Sunflower Seed Oil, which rank almost as high as Cod Liver Oil in Iodine values, suggest themselves as suitable for therapeutic use. These Oils are used both medicinally and as foods, *cf.* **Maize Oil and Soya Bean.**

We found the Iodine Numbers to be as follows :—

Cod Liver Oil ..	126–166	Sunflower Seed ..	136·1
Poppy Seed Oil ..	138·1	Soya Bean	122
Maize Oil	111		

From these we singled out Poppy Seed Oil as being the most suitable for our purpose.

We understand that this Oil is sold largely as Salad Oil*, but frequently Arachis Oil may be purveyed under the same designation, it depends which is the cheaper of the two at the time. It frequently gives a reaction for Sesame Oil. This is not due so much to deliberate adulteration as to chance contamination in the pressing. Its presence can be detected in Poppy Seed Oil with a little Hydrochloric Acid and Sugar as in the case of Olive Lil *q.v.*

Poppy Seed Oil has never been known to have any toxic action and has been used for years for the table in this way. We found it free from alkaloids.

Note.—Henbane Seed Oil is free from alkaloids, hence cannot contaminate Poppy Seed Oil with Hyoscyamus alkaloids in presses.—Y.B.P., 1913, 102.

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* Since by far the greatest part of expressed Poppy Seed Oil is used as a table oil, all edible Poppy Seed Oils are termed 'huile d'œillette.'—Thorpe Vol. IV., 1913, p. 334. It is used as an adulterant for Olive Oil.—Allen.

Oleum Papaveris.—Poppy Seed Oil.

Dose.—¼ to ½ ounce or *ad libitum.*

Genuine Poppy Seed Oil has Sp. Gr. 0·924—0·927, Iodine No. 132·6 to 143·3. It is odourless and almost tasteless,—indeed palatable. It is of light yellow colour and is in every way suitable for use both as a food and a medicine. It is contained to the extent of 50% in the seeds. Chemically it consists essentially of the Glyceride of Linoleic Acid.

***Pavimol** (T.M. 362836). *Syn.* **Emulsio Olei Papaveris.**

Dose.—½ to 1 ounce twice or thrice daily, increased if well tolerated.

An emulsion containing 50% of Poppy Seed Oil. Vegetable Oils, of course, do not contain Fat soluble 'A' Vitamins to any extent. **Beef Dripping** is added *if so ordered.* The latter contains, however, a large amount of 'saturated' fats.

Uses.—As a substitute for Cod Liver Oil in malnutrition. Weakly children increased in weight under trials with the Emulsion.

There is an increasing incidence of appendicitis in countries where much saturated fat is consumed (and *vice versa*).—L. ii./14,227.

Pavimol Capsules.—Contain 15 minims (1 Cc.), Powder and Tablets are prepared, also **Pavimol with Malt.** *Dose.*—2 drachms to 1 ounce thrice daily.

OLEUM RICINI.

Dose.—1 to 8 drachms (4 to 30 Cc.).

Expressed from seeds of *Ricinus Communis* (*Euphorbiaceæ*). ***Soluble*** about 1 in 4 or less of Alcohol 90%. Also soluble in ether and glacial acetic acid. Sp. Gr. 0·958 to 0·970. (*Off.*) Saponification No. 180, Iodine No. 84. The seeds, but not the oil, contain the poisonous protein Ricin;* the 'press cake' therefore is poisonous. The purgative action is due to the fatty acids, of which ricinoleic is a principal member.

Total acidity (as oleic acid) should not exceed 1%.

Pharmaceutical Oil as distinct from Soapmakers' and other industrial oil does not deposit in cold weather.

Flavoring.—Prescribed as Oleum Ricini Aromaticum, or with 2 drachms of Tinctura Cardamomi Composita to the ounce, or in capsules, or as 'Maricol.'

Uses.—A mild but effectual purgative rarely causing pain. It is rendered more efficacious when mixed with an equal quantity of Glycerin. The oil rubbed on the breasts will often increase the flow of milk. Castor oil is a soothing application to the conjunctiva, and is employed for making solutions of the alkaloidal bases (*q.v.*).

In sprue 1½ drachms every morning.—Cantlie, B.M.J. ii./05,1281.

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* Ricin.—A vegetable toxin or toxalbumin is tremendously potent. When small doses are injected hypodermically immunity is produced, antiricin being formed. This fact paved the way for the foundation of serum therapeutics.—P.J i./15,156.

Pharmacology.--It passes the stomach unchanged; on reaching the small intestine it is saponified by the alkaline pancreatic secretion, being converted into Glycerin and Ricinoleic Acid. This acid is irritant to the epithelium of the intestine thus causing impulses to pass to the local nerve plexus and then to the wall of the intestine. This causes the muscle to contract more—that is, increases the peristaltic movement of the intestine, and thus the contents are hastened on. If the oil were given saponified the Ricinoleic Acid would cause irritation and produce vomiting.—D. Grieve, P.J. ii./21,490.

Capsules of Castor Oil contain ½ or 1 drachm.

Capsules of Castor Oil, Compound, contain Croton Oil ¼ minim, with Castor Oil 8 minims. *Dose.*—One or two.

Enema Olei Ricini.—Castor Oil 1, Olive Oil 4. *Dose.*—5 to 10 ounces.

Oleum Ricini Aromaticum. *Dose.*—1 to 8 drachms.

Vanillin 1 grain, Peppermint Oil 10 minims, Saccharin 4 grains, Absolute Alcohol 60 minims, Tincture of Alkanet 1 in 5 Alcohol (90%) 10 minims, Castor Oil 4 ounces. The taste is covered : for children.

Castor Oil Solutions of Alkaloids.

Uses.—Instillation of Castor Oil to the eye allays the irritation caused there by foreign bodies. The alkaloidal bases (not their salts) dissolved in Castor Oil are used in ophthalmic work. They keep well. A ℞ ℙ 2% solution of the combined bases Homatropine and Cocaine have been of great service (*q.v.*). Solutions 1% respectively of ℙ Atropine, Cocaine (℞ ℙ 4% will dissolve), Ⓟ Gelseminine, Ⓟ Homatropine, ℙ Hyoscine, ℙ Hyoscyamine, and Ⓟ Pilocarpine have also been used. Physostigmine (Eserine) is used in Ⓟ ½% solution. R.O.H. has ℞ ℙ 1% with Cocaine 2%. Morphine is barely soluble in it to the extent of ℞ ℙ ½%. *In making these avoid excessive heating.* 2% each of Homatropine and Cocaine the most efficient cycloplegic.—N. Bishop Harman, B.M.J. i./20,599.

Unguentum Olei Ricini Compositum L.H.
Zinc Oxide 1, Soft Paraffin 2, Hydrous Wool Fat 2, Castor Oil 3.

Sodii Sulphoricinas. *Syn.* Turkey Red Oil.
$C_{17}H_{32}O.SO_3H.COONa = 400{\cdot}414$.

Prepared by the action in the cold (not exceeding 50° C.) of sulphuric acid 1, on castor oil 3 (sulphurous acid must not be evolved), washing with plenty of water and nearly neutralising the product with soda. It is used in the form of suppository as a purgative.

Concentrated solution of Sodium Sulphoricinate will dissolve iodine, resorcinol and naphthalene, forming strongly antiseptic solutions.

It was employed as a Glycerin Substitute in the war *e.g.* in hair preparations.

Ⓟ **Phenol Sodio-Sulphoricinate.** A mixture of phenol 1, and sodium sulphoricinate 4, is a yellowish brown thick syrup miscible with water. Used in 20 to 50% solution for papilloma and tuberculosis of larynx and ozæna.

Pharyngo-keratosis (mycosis) has been treated with 10% solution, also 10% solution of Salicylic Acid in the sulphoricinate.

Magnesii Ricinoleas. *Syn.* **'Maricol.'**

Dose.—1 to 4 drachms (**4 to 15 Gm.**).

A white powder, employed in several proprietary preparations known as 'Castor Oil Powders.' Some Castor Oil Pills, however, contain Calomel without Oil.

As much as 50% of Castor Oil can be incorporated in this way, but extraction with Ether in a Soxhlet demonstrates that the mixture is by no means a soap. 96 to 98% can be recovered. A small part of the Alkali is saponified by the free fatty acids in the oil, which then emulsifies the rest of the oil.—Otto May.

***Iodicin** (T.M. 376644). *Syn.* **Calcium Iodo-ricinoleate.**—As an innocuous mode of giving Iodine without upsetting digestion, being absorbed from the bowel. **Capsules** 3 grains. In syphilis and ulcerated wounds used with advantage.

OLEUM SANTALI.—In numerous Pharmacopœias.

With data as to Copaiba and Cubebs.

Dose.—5 to 30 minims (**0·3 to 2 Cc.**).

Santal or Sandal Wood Oil is distilled by steam under pressure from the wood of *Santalum album* (*Santalaceæ*), the yield being from 1 to 6%. A yellowish oil, with an aromatic odour and pungent taste. Consists to extent of 90% of the Alcohol Santalol. (Some Pharmacopœias specify less). Sp. Gr. 0·973 to 0·985 (*Off.*).

It is now generally held that *Santalum album* is a root-parasite, and that in the absence of suitable host plants, it fails to succeed.

For further Characters and Tests of the Oil and Notes on its Manufacture, see Vol. II.

Soluble in all proportions in alcohol 90%. Readily in ether and chloroform.

Flavoring.—Best given as Capsule.

Uses.—Internally in chronic bronchitis, *e.g.*, a few drops taken on a lump of sugar is found to relieve cough without expectoration. Is much employed in the treatment of gonorrhœa and gleet. It quickly checks the discharge in dose of 15 minims 3 times a day, and with the use of permanganate, zinc and silver nitrate injections gives good results ; also in 10 minim capsules, for chronic cystitis, with benzoic and boric acids, as adjuvants.

Santalol. *Syn.* ***Arhéol.** (T.M. 266332 and 337858). $C_{15}H_{24}O$.

Dose.—3 minims (**0·2 Cc.**) 6 to 12 times a day. The use of Santalol as distinct from its parent substance the oil has been recently advocated. Even in large doses there is no disturbing influence on the stomach or kidneys in gonorrhœa, cystitis, vesical and bronchial catarrh.

Santalol Capsules contain 5 minims (0·3 Cc.).

Santalol Formagules, 5 minims (*cf.* Formagules) are also made.

Santalol Tablets contain 3 minims of Santalol. *Dose.*—One tablet 6 to 12 times a day. These are preferred to the Capsules by some patients, but must be swallowed whole otherwise the taste is too unpleasant.

Santalol-Methyl-Salicyl Capsules contain 4 minims (0·24 Cc.) with 1 minim (0·06 Cc.) Methyl Salicylate. This combination has been found very useful in gonorrhœa.—*Campbell Williams.*

Santalyl Salicylate. *Syn.* **Salicyl Santalol.** ✱SANTYL (T.M. 275172). $C_{15}H_{23}C_6H_4.OH.COO=340·334$.

Dose.—15 to 30 minims (**1 to 2 Cc.**).

Manufacture.—According to the Patent Specification 17511/1905, since revoked, Sandal Wood Oil or pure Santalol is heated with the same quantity of Salol with the addition of a little Caustic Soda at a temperature of "100 to 200° C" if possible under reduced pressure until the separation of the Phenol is effected.

We doubt whether the desired dissociation and ester formation would take place by the above method. It would seem preferable to distil a mixture of equivalent quantities of Salicylic Acid and Santalol (possibly Sandal Wood Oil) with strong Sulphuric Acid or to pass dry Hydrochloric Acid into a mixture of equivalent quantities of Salicylic Acid and Santalol or to heat Sodium Salicylate and Sodium-Santalol with Phosphorus Oxychloride.

Yellow Oil with balsamic odour free from acrid taste. Stated not to irritate the stomach or kidneys; given for urethritis and cystitis.

Capsules of Santal Oil are prepared, containing 5, 10, 15 and 20 minims in each. **Gonal Capsules** are similar.

✱ **Savaresse's** (T.M. 11416) **Capsules** contain 10 minims, and are prepared with an animal membrane, and it is claimed are less nauseating as they generally remain entire until they have passed the stomach. The patent described.—P.J. i./07,538.

Capsules of Santal Oil 5 and 10 minims **with Methylene Blue** ½, 1 and 2 grains are prepared.

Capsules of Copaiba contain 5, 10, and 15 minims; capsules of **Copaiba and Santal Oil** of each 5 minims; also **Oil of Cubebs and Santal Oil** of each 5 minims; also **Copaiba and Cubeb Oil** of each 10 minims, and of each 5 minims.

Copaiba, the Oleo-Resin. *Syn.* BALSAMUM COPAIVÆ. In numerous Pharmacopœias.

Dose.—½ to 1 drachm (**2 to 4 Cc.**).

Is obtained from the trunk of *Copaifera Lansdorfii* and other species (*Leguminosæ*), and is imported from the northern coast of South America.

Soluble almost completely 1 in 1 of Alcohol 90%, almost entirely in Absolute Alcohol, Ether, and in four times its volume of Petroleum Ether. That known as Para Copaiba is transparent, yellowish and thinner than the Maracaibo variety, which is brownish and somewhat fluorescent. Sp. Gr. about 0·975 to 0·995 (*Off.*).

Uses.—Diuretic and stimulant to mucous membranes, chiefly used for urethral diseases, and occasionally for chronic bronchitis. May produce a red rash. Given emulsified with mucilage or saponified, but best in Capsule. *See* also Liquor Copaibæ.

Oleum Copaibæ (*Off.*)

Dose.—5 to 20 minims (**0·3 to 1·2 Cc.**). This is distilled from, and constitutes at least 45% of the oleo-resin. Sp. Gr. 896 to 0.910 Soluble in its own volume of Absolute Alcohol (distinguishes 'African'), about 1 in 20 Alcohol 90%.

Oil of Turpentine has also been used as adulterant—it is recognisable in a distillate.

1 Cc. of the oil dissolved in 5 Cc. of glacial acetic acid, and 4 drops of nitric acid added, should not develop more than a faint violent colouration (absence of gurjun oil).

Gonococcal arthritis treated by full doses of the oil, also by rubbing into the affected joints and fibrous tissue a mixture of Copaiba Oil 3, Olive Oil 1. —B.M.J. ii./11,1466.

Gonorrhœa treated by 15 minim doses at first thrice and then six times per diem with distinct effect on the discharge especially with the larger dosage —R. Stockman, B.M.J. ii./15,128.

Copaiba Resin is the residue left after distilling off the volatile oil from Copaiba. R. Stockman proved that this resin is *practically inert* as a genito-urinary antiseptic. Doses of 15 to 30 grains were given in gonorrhœa thrice daily.

Mistura Olei Santali. *Dose.*—One ounce (30 Cc.).

Oil of Sandalwood 4, Tragacanth, in powder 1. Mix, and add quickly Water to 128. Shake well. Aromatic water with syrup may be used.

Mistura Santali Composita. *Syn.* NISBET'S SPECIFIC.

(This name may be used for a preparation of the following composition without rendering it liable to stamp duty, providing this book and the page be mentioned on the label.)

Dose.—½ to 1 drachm in water or milk thrice daily.

Santal Oil 12½ drachms, Cassia Oil 1½ drachms, Pimento Oil 40 minims, Alcohol (90%) 3½ ounces.

Capsules of Nisbet's Specific are prepared containing the Oils of ½ drachm dose of the above in 20-minim capsules.

Haustus Copaibæ, St. Bart's. H. Copaiba 15 minims, Solution of Potash 5 minims, Spirit of Nitrous Ether 15 minims, Mucilage of Gum Acacia 60 minims, Camphor Water to 1 ounce.

Liquor Copaibæ, Soluble Copaiba.

Dose.—½ to 1 drachm well diluted.

Copaiba 18, Solution of Potash 26. Boil for 15 minutes, dilute whilst hot with 10 of water, transfer to a bottle and set aside to clarify; then syphon off the clear liquor from the supernatant oily portion and the sediment. Make volume of same 36 with water.

Flavoring.—Glyl Lavandulæ, Glyl Pini; Extractum Glycyrrhizæ Liquidum, Syrupus Zingiberis.

Mistura Copaibæ, St. M.'s H.

Copaiba 15 minims, Mucilage 1 drachm, Magnesium Sulphate ½ drachm, Cinnamon Water to 1 ounce.

Liquor Copaibæ cum Buchu et Cubeba.

Dose.—1 to 2 drachms (4 to 8 Cc.) well diluted.

Buchu in powder 5, Cubebs in powder 2, Alcohol (60%) *q.s.* Percolate and press to obtain 14. Mix 1 part with 2 of Soluble Copaiba.

Flavoring.—*See* Liquor Copaibæ.

Liquor Santali cum Buchu et Cubeba.

Dose.—1 to 2 drachms (4 to 8 Cc.) well diluted.

Yellow Santal Wood in powder 4, Buchu in powder 1, Cubebs in powder 1, Alcohol (60%) *q.s.* to moisten. Macerate 2 days and percolate with more alcohol and press to obtain 20.

Liquor Santali Compositus, *Martindale.*

Dose.—1 to 2 drachms (4 to 8 Cc.) diluted. Mix 2 volumes of Soluble Copaiba with 1 of the last preparation. A thick Liquor which can be almost cleared by adding 4% Potash Solution (1 in 2).

Liquor Santal cum Kava.

Dose.—1 to 2 drachms (**4 to 8 Cc.**) diluted.

Yellow Santal Wood in powder 4, Alcohol 30% *q.s.* to 15, Liquid Extract of Kava-kava 5. Is used in gonorrhœa, and is said to suppress the *ardor urinæ* and tendency to chordee, to increase the output of urine and to reduce pus.

Gelatin Capsules of Santal Oil and Kava Extract are prepared. *Dose.*—2 capsules 3 or 4 times a day.

✱**Blenosan** (T.M. 334680) is also a Santal and Kava preparation in Capsule form.

Kava-kava in these preparations is thought to act as an anaesthetic to the urethral mucous membrane, to reduce congestion and is at the same time an anaphrodisiac.

OLEUM SESAMI.
Sesame Oil.

Syn. **Benné Oil, Gingelli Oil, Teel Oil.** Expressed from *S. indicum* (*Pedaliaceæ*).

This Oil is official with Saponification No. 189-193, and Iodine No. 103 to 114. Three London Commercial samples examined by us gave 86·24, 96·85, and 109·81. It has Sp. Gr. at 15° C. 0·920–0·924. Solidifying point 4° C. Said to have advantage over Cotton-seed and Olive Oil in that it does not readily turn rancid, is easily saponified even by cold process, is a semi-drying oil, neither gummy nor sticky, readily absorbed. Is thinner than Cotton Seed Oil.

Note.—This oil may be used instead of Olive Oil in various parts of the Empire. See B.P. It has been employed for making ophthalmic solutions of alkaloidal bases washed with half its volume of strong alcohol to free from fatty acids. The oil is separated and filtered if necessary. It is then sterilised at 120° C. for half an hour.

Emulsio Olei Sesami.

Sesame Oil 600 Gm., Water 300 Cc., Solution of Sodium Hydrate (Sp. Gr. 1·33) 6 Cc.

Dose per diem 2 to 3 ounces. Used by Prof. Arloing in the treatment of diabetes.—Pr., June, 1911.

P1 OPIUM.

Syn. **Humbergum, Tabaiaco, Succus Papaveris Somniferi Capsulæ Inspissatus.**

(*The latter or the contraction*—**Succ. Papav. Inspiss.** *may be used in prescriptions to denote Opium where it is desired to refrain from using this name.*) **Pulv. Succ. Papav.** *will denote Powdered Opium.* (9·5 to 10·5% *Morphine.*)

P1 '*Opium and all preparations or admixtures containing* 0·2 *or more per cent. of morphine.*' (*Altered January* 3, 1921).

B *Medicinal Opium* ("*raw opium that has been artificially dried*"), *preparations and any substance containing one-fifth per cent.* (*one part in five hundred*) *or more of anhydrous morphine.* RAW OPIUM *includes powdered or granulated, but not medicinal, Opium.—See also Morphine and Diamorphine.*

Dose.—½ to 2 grains (**0·93 to 0·12 Gm.**).

FR. CX.—*Max. single dose* 3 grains; max. during 24 hours 9 grains.

Antidotes.—*See* Morphine.

The inspissated juice obtained by incision of the capsules of *Papaver somniferum* (*Papaveraceæ*) from any geographical source. The Turkey product is best suited for pharmacy. Persian and Indian contain a large proportion of Narcotine.

Papaveris Capsulæ, Poppy Capsules. (B.P. '98).

Ⓟ "*Poppies, all preparations of, excepting red poppy petals and syrup of red poppies* (*Papaver rhœas*)."*

In the dried condition are used to prepare

Ⓟ **Decoctum Papaveris** 1 in 10. This is employed as fomentation in neuralgia, peri-dental abscesses and gum-boils.

Ⓟ **Decoctum Papaveris et Anthemidis.** Poppy Capsules 10, Chamomile Flowers 5, Water *q.s.*, boiled 10 minutes to produce 100. Employed as the last mentioned.

For galenical preparations, **Opium** *Off.*,and B.P. 1898, must contain when dried and powdered, between 9·5% and 10·5% of anhydrous morphine. Opium Fr. Cx. must contain 10 to 11% on the drug dried at 60° C. F.I. requires 10% U.S. 10 to 10·5% Anhydrous Morphine; for the Tincture and Extract (*Off.*), may be used if containing when dry not less than 7·5%, these preparations being standardised when prepared.

℞ℙ Opium P. Jap. IV. assayed according to the directions works out as 10.12 to 11·12% Anhydrous Morphine.

For Assay Methods, See Vol. II.

℞ℙ **Opium U.S. VIII.** *Average Dose.*—1½ grains (**0·1 Gm.**). In its normal moist condition was to yield not less than 9% crystallised morphine (as in 1890). U.S. IX. requires not less than 9·5% Anhydrous Morphine.

It is difficult to understand why the U.S. specifies *P. Somniferum* and its variety *album* as it would be impossible to say whether either had been used. —E. M. Holmes, P.J. ii./16,485.

Investigations on Indian Opium. The terminal, or oldest, poppy capsules produce Opium of higher Morphine content than the lateral ones. Influence of manures. Indian Opium can be produced containing 20% Morphine, as rich, therefore, as Turkey Opium.—H. E. Annett, P.J. i./22,192.

A Comparison of International Preparations of Opium with special reference to the International Agreement of 1906.—H. B. Stevens, B.P. Conf., 1923; P.J. ii./23,110.

Incompatible with Vegetable Astringents, Alkaline Carbonates, Salts of Mercury, Iron, Lead and Zinc.

Uses.—The oldest and most certain remedy for pain, also tends to check inflammation and relieve nervous diseases; lessens cough, arrests diarrhœa and dysentry (but is not advised for cholera). Externally the liniment is used for rheumatism, neuralgia and sciatica and is added to fomentations, and the ointment is applied to piles and fissures of the anus. Has some power in controlling the amount of sugar in diabetes. Children are very susceptible to its action.

It relieves the pain in appendicitis but must not be given for this, as, apart from the danger of the symptoms being masked, opium may paralyse the intestines and cause tympanites.

In cholera its use in any form is highly dangerous.—Brooke. Koch stated that even if a certain natural immunity exists against cholera it is immediately abolished directly the peristalsis is interfered with by Opium.

A great actress faced the ordeal of the first night by means of 7drops of Laudanum. John Hunter who disliked public speaking nerved himself for lecturing with 30 drops. The procedure may, however, bring about failure or lead to Opium habit.

* Fleurs de Coquelicot=Poppy Petals.

De Quincy took 9 ounces of Laudanum a day (*circa* 300 grains of Opium). Two cases are on record in which 16 ounces per diem were taken,—these lived to advanced age. 'Speech' fright and stage fright are well treated by small doses of Opium just before the effort has to be made, *e.g.*, ¼ grain or 6 to 10 minims of Vinum Opii just before going into an examination, or a first appearance on the stage. Some advise a little Cannabis in addition.

Opium is stimulating to nerves, brain, &c., as well as being sedative, —in this respect it is stronger than Morphine. Stimulating effect, *e.g.*, in indolent ulcers of skin and mucous membrane, best obtained by small frequent doses.—B.M.J. ii./09,1606.

Ulcerative stomatitis, common amongst ill-fed children, well treated by 2 to 5 drops of Laudanum twice daily.—*ibid.*

Gangrenous varicella in year-old child cured by Iodoform dressing and 1 minim of Laudanum every 4 hours.—*ibid*

Quiets nervous irritability, and gives a welcome spur to jaded nerves. For infants dose is ¼ minim of Laudanum for every three months of life. Can be repeated every 6 hours. With care no danger of undesirable consequences.—*ibid.*

In cases of peritonitis from perforation of stomach or bowels where surgical treatment is undesirable Opium may be safely resorted to. In peritonitis there is marked tolerance to Opium even by infants.—*ibid.*

Looseness of bowels well treated by Laudanum. In colitis where tenesmus is distressing, and stools contain blood and mucus supplement dose by mouth by rectal injections (2 to 5 minims for a child) with a few grains of powdered Ipecacuanha in ½ oz. of thin boiled starch.—*ibid.*

Given as hypnotic and not to relieve pain. Opium should be taken 2 to 3 hours before bedtime.—*ibid.*

Its use in acute pneumonia may be attended with risk. In uræmic convulsions may be useful. To test truthfulness of statement of Morphine maniacs who have undertaken to cure themselves, the **Urine should be examined for Morphine.** At the end of 8 days from the beginning of abstinence the drug should have passed completely from the system.—*ibid.*

Melancholia—the mental pain of—treated by tonics, and in addition 5 minims of Laudanum thrice daily given without patient's knowledge, rapidly increasing until definite result.—B.M.J. i./11,804.

Pruritus vulvæ in a severe case, 1 grain doses in pill was the only drug giving relief.—B.M.J i./12,472.

Sciatica. Opium Extract ½ grain with Valerian in a mixture every 2 hours or Opium Extract ½ grain with or without Cocaine Hydrochloride ⅓ grain in suppository.

If the Opium Extract (½ grain) be combined with Belladonna Extract ⅓ grain in the suppository, constipation will be prevented.—Pr. March 1911, p. 459.

Abuse of Opium, Morphine, and Cocaine.

The International Opium Convention of 1912 awaits ratification. Cocaine smuggling into India proceeds to a great extent. China has the importation of Opium well in hand.—P.J.i./12,154; B.M.J.ii./13,1102, *cf.* also Cocaine.

Third International Opium Conference Report.—B.M.J. i./15,636.

The British Government hoped to bring the deliberations of the previous International Conferences, and in particular the laws, regulations and measures contemplated by the Opium Convention of 1912 to confine to medical and legitimate purposes the manufacture, sale and use of Opium, Morphine, Cocaine and similar noxious and habit-forming drugs before the Peace Conference in Paris with a view to the adoption of a resolution binding the Powers represented at the International Conference to the speedy enforcement of the measures in question—the resolution to be made binding on the enemy powers also.—B.M.J. i./19,321.

Smoking Opium. An illustrated account.—Prof. Greenish, P.J. i./16,517.

In Formosa an Opium smoker must have a licence from the Japanese Government. It is difficult if he reforms to induce the police to receive back the ticket.— G. Gushue-Taylor, B.M.J. ii./21,1010.

Resolution of Advisory Committee of League of Nations at Geneva, 1922, on Traffic in Opium. Need of international system of import and export certification. Approximate consumption per 100,000 inhabitants to be ascertained.—P.J. ii./22,304.

British Morphine exported thought to be in excess of purely medical requirements.—B.M.J. i./20,339.

Numerous countries—Persia, Albania, Argentine, Colombia, Costa Rica, Luxemburg, Paraguay—not yet ratified unreservedly the Opium Convention of 1912.—B.M.J. ii./22,239,938.

Opium Smoking. 100 Gm. in smoking yields HCN 0·01 Gm., Pyridine 0·147 Gm., NH_3 0·395 Gm., Morphine 0·016 Gm.—no Carbon Monoxide.—*Cf.* the figures in respect of Tobacco, p. 845.—W. E. Dixon, B.M.J. ii./21,819.

The drug addict is a product of modern civilization, and addiction is a symptom of a diseased mind; he is often a psychopath first. Description of Opium smoking; the Morphine in 10 pipes is only about ½ grain and 99% of this is destroyed in combustion. These addicts should not be regarded as criminals—they are mental cases. The Harrison Narcotic Law has proved a failure in the U.S.A. The legal cure in this country, on parallel lines, may be worse than the disease.—Prof. W. E. Dixon, B.M.J. i./23,544 (see also abstract under Cocaine).

Prof. Dixon's statements re Opium smoking strongly criticised. To say that the Opium smoker does not form a strong craving, and that he is easily cured, is simply not true. An Opium smoker passes through his cure with intense misery, especially manifesting itself in diarrhœa. The craving is intense.—J. Preston Maxwell, B.M.J. i./23,1076.

Indian Hemp in India does not get the same hold on addicts as opium. There is much smuggling of Morphine by ships' crews. Morphine is abused by hundreds of thousands.—"Drug smuggling and taking in India and Burma."—Roy K. Anderson, B.M.J. ii./22,645.

Over £1,000,000 worth of drugs seized in New York during year ending June, 1923; most of it Heroin.—P.J. i./23,549.

Opiate Addiction.—E. Huntington Williams has written a book upon this subject (MacMillan 1922). It is almost completely from the American standpoint, and deals with the use of narcotics and their "**Withdrawal**" and "**Gradual Reduction.**"

In treatment by withdrawal from a person taking Morphine or Heroin, the peculiarity is that the affections so produced—uneasiness and nervousness, followed by yawning, sneezing, watering of the eyes, excessive mucous secretion, extremities becoming cold and clammy sweatings—are relieved almost instantly by even a minute dose of the narcotic. While it is theoretically impossible for the addict to obtain his narcotic without the knowledge of the Federal authorities, in point of fact he is able to obtain the drug clandestinely almost everywhere in the U.S.A., the amount of his purchases being limited only by the capacity of his pocket.

In opiate addiction successful treatment lies in the administration of a non-habit-forming Opium derivative, *e.g.* Codeine or Ethyl-Morphine. The gradual reduction treatment does not permit the sole use of the Hyoscine class, as large doses of these alkaloids have to be given, in fact, if his sufferings are to be relieved, the patient must be made quite 'groggy,' by means of either Hyoscine or Atropine.

In some patients, who are addicted to hypodermic medication, it is worth

while changing the method of treatment to one *per os*, but it should be noted that about 25% more of the medicament is required by this latter method. An important point is the giving of the same *quantities of solutions* either hypodermically or orally, the patient naturally associating a smaller quantity of diluent with an attenuated supply of drug.

The following appears to be the usual procedure in the Gradual Reduction Treatment, and usually lasts about two months :—

During the first 20 *days* the amount of Morphine hypodermically is decreased gradually, and the decrease made up either by giving the deficit, plus 25%, by the mouth, or by exactly replacing the amount of Morphine stopped with Codeine Sulphate. A gradually increasing dose of Strychnine, either with the injection or *per os* should be given.

The next 6 *to* 12 *days* should see the Codeine entirely replace the Morphine hypodermically, the Strychnine as previously, should be given and the Morphine *per os* should be gradually diminished, though, of course, the volumes of all solutions given must remain the same. The daily amount of Codeine must now be lessened, a period of about 10 to 20 days being occupied (according to the honesty and disposition of the patient) in reducing the amount to zero. During these last stages, a bitter tonic should be given and a daily dose of Hyoscine Hydrobromide of 1/50th of a grain is required.

Acidosis should be treated with Milk of Magnesia, and Cascara is useful for the frequently attendant constipation.

It is interesting to know that some American States, *e.g.* California, fix the rate of reduction of drug from an addict at 1 grain of Morphine or ½ grain of Heroin weekly.

The Lambert-Towns Rapid Withdrawal Method is an extraordinary one, in which enormous quantities of Blue Pill are given, together with decreasing amounts of Morphine and increasing quantities of Belladonna, Xanthoxylum and Hyoscyamus Mixture. v.p. 239. The treatment appears to culminate in the administration of 2 ounces of Castor Oil, the nervousness of the patient being controlled with Codeine!

The Pettey Method (George E. Pettey) includes the administration of Scopolamine in 1/200th grain doses, Sparteine Sulphate in 2 grain doses and Sodium Thiosulphate in doses of 20 grains, every 2 hours for 24 hours. Cathartic capsules, containing Calomel, Cascara, Ipecacuanha, Strychnine and Atropine are also given.

In these more rapid methods Dionin is stated to be more efficacious than Codeine; as it is about twice as powerful, it is argued that half the dosage will suffice. This is taken advantage of in

Sceleth's Method, in which Ethyl-Morphine Hydrochloride ½ grain is combined with Scopolamine, Pilocarpine and Cascara, and an amount varying with the amount of Morphine taken is administered daily for 10 days. Then Strychnine 1/30th grain, three times a day for 1 day, and on the following day the dose is halved and continued for a week. In about 4% of the cases Scopolamine delirium has been observed. In such cases it should be omitted for a few doses.

Hyoscine and Pilocarpine constitute the bases of **Bishop's Method,** with sometimes the addition of Heroin during the active stage.

℗ **Emplastrum Opii** (B.P. 1898). 1 in 10 of Resin Plaster.

Opium locally, it is stated, has no effect.—B.M.J. ii./09,329.

Fr. Cx., Opium Extract 1, Elemi 1, Diachylon Plaster (Fr. Cx.) 2.

Ⓓ℗ **Extractum Opii (Siccum)** (*Off.*) is now powdered. It is same strength as B.P. 1898. U.S., P. Austr., Ned., Helv., Belg., Hung. Foreign Synonym—Extractum Tebaiaco.

Dose.—¼ to 1 grain (**0·016 to 0·06 Gm**).

An aqueous extract standardised to 20% of morphine.—F.I. adopts.

Fr. Cx. has the same with maximum single dose 1½ grains; maximum in 24 hours 5 grains approximately.

Ⓓ℗ **P. Jap.** IV. has approx. 16·87 to 18·54% morphine.

℞℗ **Extractum Opii Liquidum** (*Off.* and B.P. 1898).

Dose.—5 to 30 minims (**0·3 to 2 Cc.**).

Extract of Opium 0·75, Distilled Water 16, Alcohol (90%) 4. Is of same strength as Tincture of Opium (B.P. '98), containing 0·75% of morphine.

℞℗ ✱ **Liquor Opii Sedativus.** (*Battley* T.M. 12765). *Dose.*—5 to 15 minims. (**0·3 to 1 Cc.**). A proprietary hypnotic and sedative. One and a half times the strength of Tincture of Opium, *i.e.*, it contains 1·5% Morphine.

Origin of and details of composition of a preparation intended to resemble the latter.—P.J ii./14,136,213.

℗ ✱ **Papine.** (T.M. 214925). A proprietary article.

Dose.—1 drachm (=⅛ grain Morphine Hydrochloride). Children under one year 2 to 10 drops. Said to contain the anodyne principles of opium without the narcotic and convulsive properties.

℗ **Linctus Opiatus C. X.**

Liquid Extract of Opium 2 minims, Oxymel of Squill 20 minims, Dilute Sulphuric Acid 5 minims, Treacle 20 minims, Water to 1 drachm.

℗ **Linctus Scillæ St. M.'s H.**

Oxymel of Squill ½ drachm, Compound Tincture of Camphor 15 minims, Honey to 1 drachm.

℗ **Linctus Scillæ Opiatus.**—*Syn.* **Linctus Camphoræ Compositus St. Bart's., L. H. Gee's Cough Linctus, E.L., Linctus Scillæ Compositus E.G.A.**

Dose.—1 drachm (**3·5 Cc.**).

Paregoric, Oxymel of Squill, and Syrup of Tolu, equal parts.

℗ **Linctus Tolutanus cum Opio.** **Brompton H.** uses Syrup of Squill *vice* Oxymel in latter.

℞ **Linimentum Opii** (*Off.* and B.P. 1898). (*Exempted from* ℞).

Tincture of Opium 1, Liniment of Soap 1; filter after a few days. A commonly used anodyne for pain.

Dixon says has no effect.—B.M.J. ii./09,329.

℗ **Mistura Sodæ cum Opio, St. M.'s H.**

Liquid Extract of Opium 3 minims, dilute Hydrocyanic Acid 2 minims, Sodium Bicarbonate 6 grains, Water to 1 ounce.

℞ **Pulvis Cretæ Aromaticus cum Opio** (*Off.*, and 1898). (*Exempted from* ℞).

Dose.—10 to 60 grains (**0·6 to 4 Gm.**).

Contains Opium 1 with 39 of Pulvis Cretæ Aromaticus, which has *dose* 10 to 60 grains (**0·6 to 4·0 Gm.**). The latter was the old "Aromatic Confection." ℗ Tablets each 5 grains (**0·3 Gm.**).

℞℗ **Pulvis Opii Compositus,** (*Off.*).

Dose.—5 to 15 grains (**0·3 to 1 Gm.**).

Opium 10, Black Pepper 15, Ginger 30, Caraway Fruit 42, Tragacanth 3. Contains 1 of Opium in 10.

℞℗ Tablets of Opium ½ and 1 grain.

℗ **Tinctura Camphoræ Composita.**—*Syn.* PAREGORIC. (*Off.*, and B.P. 1898). Is known on the Continent as **Tinctura Opii Benzoica.** *Syn.* FR. CX. 'ELIXIR PAREGORIQUE.' *Dose.*—½ to 1 drachm (**2 to 4 Cc.**).

Tincture of Opium 50, Benzoic Acid 5, Camphor 3, Oil of Anise 3, and Alcohol (60%) to 1000. F.I. requires 0·05% Morphine. *Off.* approximates this. Fr. Cx. has this strength.

℗P.G.V. and **Ph. Ned.** have 0·05% Morphine, but amounts of other ingredients varied. ℗**P. Jap.** has 1 of Opium in 200.

Tinct. Camph. Co. of the Portuguese Pharmacopœia is a liniment containing 20 times as much Opium as the British tincture.—C. Rousseau, B.P. Conf. 1923.

Flavoring.—Syl Coriandri, Glyl Pini; Elixir Aromaticus.

℗**Tinctura Opii Camphorata, U.S.**

Average dose.—1 drachm.

Similar in composition. 1 of Powdered Opium in 250.

The presence or otherwise of Morphine may be detected and indeed compared with a Standard Paregoric by working on as small an amount as 2·5 Cc. of a specimen. The details of the method must be carefully adhered to.—Bird, P.J. ii./05,155.

℗**Syrupus Camphoræ Compositus, Bristol Infirmary** (revised).

Dose.—1 drachm (=laudanum ¾ minim approx.) occasionally.

Benzoic Acid 45 grains, Glacial Acetic Acid 7 drachms 20 minims, Vinegar of Squill and of Ipecacuanha each 10 ounces, Anise Oil 30 minims, Camphor 30 grains, Opium Tincture 2 ounces, 5 dr. 20 minims, Sugar 7 lbs., Caramel *q.s.*, Water to 1 gallon. Pharm. Form. advises at least 2½ ounces of Spirit to dissolve the oil, Camphor and Benzoic Acid. Mix the solution with the Laudanum and add to the cold syrup with stirring, then the colour.

℞ℙ**Tinctura Opii**—*Syn.* Laudanum (*Off.*). *Syn.* Tinctura Thebaica.

Dose.—20 to 30 minims (**1·2 to 2 Cc.**), or 5 to 15 minims (**0·3 to 1 Cc.**), repeated.

Standardised to contain 1% (B.P. '98 was 0·75%) of anhydrous Morphine.

℞ℙU.S. IX. has 1 of Granulated Opium (10 to 10·5% Anhydrous Morphine) in 10 of Diluted Alcohol (49% by vol.). **Ph. Ned., P. Hung.** and **P. Belg.** contain 1% Morphine, made with 70% Alcohol. Fr. Cx. dissolves 1 Gm. Opium Extract in 19 Gm. Alcohol 70% to produce the same strength.—*Maximum single dose* 35 minims, and during 24 hours 110 minims approximately. We found Sp. Gr. of this to be 0·902. F.I. requires 10% strength by percolation with Alcohol 70% and to contain 1% Morphine. *Off.* approximates this.

It is desirable to mix the dried Opium in coarse powder with twice its weight of washed and dried sand and to percolate with Spirit without macerating first of all. Conducted in this way the Opium will not 'block,' similarly also in the case of Tinctura Opii Crocata.—P.J. ii./09,2.

Suggestions to revert to Redwood's process of 1885 with the addition of percolation, also revision of process for estimation of Opium.—A. C. Abraham and Co-Workers, P.J. i./22,356.

In support of the current B.P. method of making Tincture of Opium, and the B.P. process of Opium assay—remarks on A. C. Abraham's and P. A. W. Self's papers.—D. B. Dott, P.J. ii./22,22,205. See also pp. 128, 205, 231, 260.

For further remarks on estimation see Vol. II.

Flavoring.—Syl Menthæ Piperitæ, Syl Rosæ; Syrupus Zingiberis.

Uses.—*See* Opium.

℞ℙ**Tablets** = Tincture of Opium 5 and 10 minims are prepared, weighing 2½ and 4½ grains.

℔ ℙ1 ✱**Nepenthe** (T.M. 464) (or ANODYNE TINCTURE) is similar and is given in dose as Tinctura Opii (*Off.*). Incompatible with alkalis. *It contains* 0·84% *Anhydrous Morphine.*

℔ ℙ1 **Tinctura Opii Crocata.** SYDENHAM'S LAUDANUM.

Dose.—5 to 20 minims (**0·3 to 1·2 Cc.**).

F.I. requires 1% Morphine. FR. CX. Supp. 1920.—Opium 110, Saffron 50, Cinnamon Oil 1, Clove Oil 1, Alcohol 30% 920—all by weight (conforms with F.I.). Max. single dose, 2 Gm. (=30 minims), max. during 24 hours 6 Gm. (=90 minims) approx. Other continental formulæ approximate this.

℔ ℙ1 **Vinum Opii Crocatum**, as used in Thieleman's Koleradraber (*q.v.*), in Norway, has the composition:—Opium Powder 15, Ceylon Cinnamon 1. Cloves 1, Saffron 5, Malaga Wine 150, *i.e.*, approximating the Tincture of P.G.

℔ ℙ1 **Tinctura Opii Deodorati, U.S.**

Average dose.—8 minims (**0·5 Cc.**).

Granulated Opium 100 (purified by Petroleum Benzin 75), Alcohol 200, Water to 1,000.

A modified method of deodorising (Gordon's) is mentioned by Caspari. Macerate Opium 100 Gm. in water *q.s.*, and concentrate infusion to 500 Cc. Heat to 82° C., add Paraffin, melting at about 50° C., 150 Gm. in small pieces and when liquefied shake thoroughly 10 minutes. Allow to cool, remove paraffin cake, and make up filtered liquid to 800 Cc. with Water and Alcohol 200 Cc., finally with Water to 1,000 Cc.

℗ **Tinctura Opii Ammoniata** (*Off.*).—*Syn.* SCOTCH PAREGORIC

Dose.—½ to 1 drachm (**2 to 4 Cc.**).

Contains 0·1% Anhydrous Morphine. One ounce contains, quite approximately, ½ grain anhydrous morphine.

℗ **Trochisci Opii B.P.** 1885.

Contained $\frac{1}{10}$ grain Extract of Opium in each, with liquorice.

℗ **Trochisci Sedativi, T.H.**, contain the same quantity with fruit basis, and are marked 'S.'

℔ ℙ1 **Unguentum Opii.** 1 of extract in 10 of Unguentum Cetacei.

ℙ1 **Unguentum Gallæ cum Opio.** (*Off.* and B.P. 1898).

Contains 7·5% of Opium with Gall Ointment (Galls 1, Benzoated Lard 4). Exempted from ℔.

ℙ1 **Collapsible Tubes** with rectal tube are for use in hæmorrhoids. Dixon says opium locally has no effect.—B.M.J. ii./09,329.

℔ ℙ1 **Vinum Opii, B.P.** 1885.

Dose.—10 to 30 minims (**0·6 to 2 Cc.**).

Contained 1 of Extract in Sherry 20, with Aromatics.

℔ ℙ1 ✱**Alopon** (T.M. 365294). *Dose.*—1/6 to 1/3 grain (**0·01 to 0·02 Gm.**) A powder comprising the hydrochlorides of a mixture of the Opium alkaloids. Readily soluble in water. Gastric and intestinal sedative; also in nervous conditions and in diseases of the respiratory tract. Used as an analgesic and hypnotic prior to operation as an adjunct to general anæsthesia.

℔ ℙ1 **Tablets**, Oral, 1/6 grain in each. *Dose.*—1 or 2 tablets, Hypodermic, 1/3 grain. *Solution*, 2 per cent. for Oral use. *Single Dose.*—15 to 30 minims, repeated 5 to 15 minims. *Glass Capsules* 1/3 grain in each also 1/3 grain combined with Atropine 1/150 grain and 2/3 grain with 1/150 grain Scopolamine.

℔ ℙ1 ✱**Omnopon** (T.M. 317126) *Syn.* PANTOPON—*Dose per os*—1/6 to 1/3 grain (**0·01 to 0·02 Gm.**) thrice daily.

This preparation is stated to be a mixture of the soluble hydrochlorides of Opium Alkaloids in the form of a brown powder. Sahli experimented with the various alkaloids in Opium and concluded that the most effective narcotic would be a stable solution of these in which the strength of each could be determined. 1 Gm. of Omnopon is equivalent to 5 Gm. of 10% Opium.

Composition.—Morphine 52%, Narcotine 20%, Codeine 2%, Papaverine 2·5%, Thebaine 1%, Narceine 1·2%, other alkaloids 4%, Water 8%, Hydrochloric Acid 9%.—F. W. Watkin Thomas, Bio-Chem. Jl *Vol. VI.* part 4, 1912.

When used as an injection (Ampoules are made) 1 Cc. of 2% solution is injected 1 hour before operation, though the dose should preferably be subdivided and given at intervals, *e.g.*, ½ Cc. 1 hour prior to operation and another ½ Cc. just before, *i.e.*, as preliminary to Chloroform or Ether anaesthesia.—Anodyne action is striking.—L. ii./10,1169; L. i./11,368,673.

℞ P1 **Tablets** of 1/6 grain Omnopon each = 5/6 grain Opium *Off.*

For internal medication in suitable cases.

℞ P1 **Ampoules** contain 1·1 Cc. of 2% solution in 25% Glycerin and Water = 25 minims Opium Tincture B.P. 1898. 1 Cc. = ⅓ grain Omnopon.

Phthisical cough relieved. Especially useful in advanced cases (night sweats, etc.) where palliative treatment is alone possible. Control of hæmoptysis by 1/3 grain. Relieved pain in cancer cases and in gastric ulcer and useful in diarrhœa and intestinal catarrh. Used with advantage in the first stage of labour without diminishing force or duration of the uterine contractions. Dyspnœic attacks of bronchial asthma rapidly subside after 1/3 grain subcutaneously. Can be used in cases of chronic renal insufficiency in 1/3 grain doses for dyspnœa.—C. L. Williamson, and G. W. N. Joseph, M.P.C., Sept. 17'13.

Omnopon ⅔ grain **with Scopolamine** 1/150 grain is used as intra-muscular injection to subdue post operative pain May be followed by a second dose ½ the strength.—Said to be a safe narcotic.—L. ii./11,672,

For anæsthetic purposes deep intramuscular injection of 1 Cc. 1¼ to 1½ hours before operation, followed by a local anæsthetic, to infiltrate the tissues in the operation area. When ether is employed the amount required is greatly lessened.—H. M. W. Gray, L. Sept. 2,1911, and B.M.J., Aug. 22,1914. See also W. de C. Wheeler, Med. Press. Apl. 1,1914, also M. Ramsay on its use in ophthalmic surgery.—L. April 25 '14.

℞ P1 **Omnopon Atrinal.** A combination of Omnopon with an Atropine derivative. Ampoules contain 1·1 Cc.; each Cc. contains 0·02 Gm. (⅓ grain) of Omnopon with 0·001 Gm. (1/60 grain) of Atrinal. This latter substance has a corrective effect on the Morphine. Suggested where stimulation of the respiratory centre is indicated. In asthma, chronic emphysema and tachycardia, also in gastric ulcer, pyloric and intestinal spasm and the like and as an adjuvant to general anæsthesia.

℞ P1 ✱ **Opoidine.** (T.M. 419166.) *Dose.*—Tablets contain 1/6 grain (0·01 Gm.). The total alkaloids of opium in a soluble form, one part being equivalent to 5 of opium. It contains about 50% Morphine. The Narcotine in the remainder is thought to 'potentiate' the Morphine (Straub). Hypnotic, sedative, analgesic and in other respects representing Opium.

Hypodermic Tablets and Ampoules contain ⅓ grain (0·02 Gm.).

OVULES VAGINALES.

Ovules are oviform vaginal pessaries prepared with Glycogelatin basis or with Theobroma Oil basis.

Ovules dissolve slowly and hence produce a continued action of the medicament on the parts in cases of leucorrhœa, also for ulceration and inflammation of the cervix uteri.

Each Ovule weighs approximately 4 drachms (15 Gm.):—

Adreucaine = ½ and 1 Cc. (anodyne and astringent).

Apiol, 5 minims (to relieve amenorrhœa).

Aristol, 5 to 10 grains (antiseptic).

℗ Belladonna Extract, 1 grain (sedative).

Boric Acid, 15 grains (soothing).

Carbolic Acid, ½ grain (antiseptic).

℞ ℙ1 Cocaine Hydrochloride, $\frac{1}{4}$, $\frac{1}{2}$ and 1 grain (local anæsthetic).
℞ ℙ1 Cocaine Hydrochloride, 1 grain with Adrenalin $\frac{1}{500}$ grain (anæsthetic and astringent).
Copper Oleate, 5 grains, *cf.*, p. 602 (in malignant disease).
ℙ1 Ergot Extract, 2 grains (astringent ?).
Hamamelis, 10 minims of Liquid Extract (anti-hæmorrhagic).
Ichthyol, 5, 10 and 12½% (30 grains in each) (in ulceration, antiseptic and stimulant). Preferably made with Theobroma basis.
Iodine, 1 grain (astringent and antiseptic).
Iodoform, 5, 10 or 15 grains (antiseptic).
Iodol, 2 grains (antiseptic).
℗ Morphine Hydrochloride, $\frac{1}{4}$ and ℞ ℙ1 $\frac{1}{2}$ grain (anodyne).
Naphthol, 1 grain (antiseptic).
℗ Opium, 1, 2 grains (sedative).
Quinine Hydrochloride, 3 grains (in leucorrhœa and to check conception).
Resorcin, 3 grains (antiseptic).
Suprarenal Extract, 5 minims (hæmostatic).
Tannic Acid, 8 grains (astringent). Made with Theobroma basis.
To be efficient these ovules must be inserted as far as possible whilst the patient is in the supine position with the hips raised. A sanitary towel may be worn at the same time. Most effectual at bedtime.

Gelatin Ovules for hot climates are made slightly harder.

Theobroma Ovule Mass for hot climates.

Suitable proportions of White Wax raise the Melting Point of Theobroma Oil. Our experiments using Theobroma Oil Melting Point 93° F. (before melting and on resolidifying 90·5° F.) and White Wax melting at 142° F., show the following :—

A mixture containing	2½%	White Wax gives M.Pt.,	90·5° F.
,, ,,	4 % and 5%	,, ,, ,, ,,	91·5° F.
,, ,,	10%	,, ,, ,, ,,	103° F.
,, ,,	15%	,, ,, ,, ,,	115° F.
,, ,,	20%	,, ,, ,, ,,	122° F.

On the whole we consider the 15% addition of Wax the best—it melts in contact with the mucous membrane. See also **Suppositories.**

OXYGENIUM.

OXYGÈNE Fr. Cx. O=16.

Oxygen is obtained commercially by the rectification of liquid air by a process of fractional liquefaction. It is available so made of not less than 98·5% purity. For detailed description of the apparatus used see Thorpe. The Barium Oxide process is not used now.

Liquid air as a source of Oxygen, *e.g.*, for aviators at high altitudes—can be obtained up to 80% pure.—B.M.J. ii./19,77.

Sodium Peroxide (Oxylith) has been used for generating oxygen in Metal generators by the gradual addition of water but our experience is that the method is not suitable for therapeutic purposes—much heat is evolved, strongly alkaline vapour and spray are liable to be carried over and the method is hardly one which can be trusted to a nurse or layman.

Oxygen made from this, thought to be more active than ' Chlorine ' Oxygen or dead oxygen in a cylinder.—H. A. Ellis, L. i./20,569.

It is sold compressed in **Cylinders** containing the equivalent of 20 cubic feet (560 litres approximately) at normal temperature and pressure and upwards for inhalation from an **Inhalation Bag.** By the aid of this, the oxygen may, if desired, be mixed with air as it is administered to the patient, or the gas may be passed direct into the patient's mouth by a glass tube or from a funnel which is suspended above the face (the latter method is probably of little use—*vide infra*).

Sp. Gr. 1·10527 (Air=1). It is therefore slightly heavier than air, 1 litre weighs 1·429 Gm. at 0° C. and 760° m.m. pressure. At 20° C. and under normal pressure 1 litre of water dissolves 28 Cc. of oxygen.

Ozone. O_3=48.

Is known as active or tri-atomic oxygen. It is a very powerful oxidising agent, the third atom of oxygen in the molecule being in the labile condition.

The effect of passing electrical currents through oxygen is to produce ozone which may be recognised by the peculiar odour. When in large quantity it is irritating to the air passages, giving rise to cough and also producing headache. Mildly ozonised air has been inhaled for phthisis and the spasmodic stage of whooping cough.

It has been suggested that inhalation of Ozone is injurious to the respiratory tract rather than beneficial in warding off injurious diseases, but this is exaggerated. Experience in the Central London Railway and elsewhere proves the contrary. There is no doubt that Ozone does not only mask bad smells but destroys them.—Ozonair Ltd.

Dysentery treated by Ozone after Ipecacuanha and Opium failed to keep it in check. Ozone has a powerful action on cholera and typhoid organisms. The lower intestine was gently washed out from time to time with ozonised water and ozonised water was freely drunk by the patient while the Ipecacuanha and Emetine was continued. The air of the sick-room was also kept slightly ozonised. The result was a cure.—F. M. Lessing, L. ii./13,1255.

Surgical use of Ozone. Sinuses healed.—G. Stoker, L. i./17,797.

Uses of Oxygen.—

Warm the gas by discharging it into a rubber gas bag and keeping in same for an hour or two if possible prior to use. Open the cylinder in an adjoining room so as to not alarm the patient.

A **hot water box** may contain a spiral metal tube through which the Oxygen passes to the patient from the bag. **A Woulf's Bottle** containing hot water is also useful—the gas being bubbled through it.

Inhalation of oxygen is of great service in pneumonia, bronchitis, asthma, angina; it relieves dyspnœa, and reduces temperature. May be used after chloroform to accelerate recovery. It is the best cardiac and respiratory stimulant. Severe cases of whooping cough have been treated—give just before onset if possible. Vomiting of phthisis.—A few whiffs of Oxygen are stated to be effective in preventing the severe form of cough in phthisis which usually ends in vomiting. It is a successful antidote to morphine, opium, strychnine, cyanide, and carbon monoxide poisoning; for resuscitation after partial drowning, and threatened death from inhalation of nitrous oxide. Its local use is valuable in ulcers and alopecia.

Injection of Oxygen.

Endovenous injection of 120 Cc. of oxygen slowly in the case of a patient *in extremis* has been practised. Sciatica has been treated by the hypodermic injection (deeply) of 250—400 Cc. of Oxygen.

In the dyspnœa of tuberculosis, gas poisoning, pneumonia, bronchial asthma, and operative cases oxygen has been *injected subcutaneously* until a lump the size of a closed fist is raised. The local emphysema is virtually an artificial lung lasting for hours; results remarkable—the body absorbing that which is necessary. Animal experiments suggest that Oxygen Injections should be made as a treatment for tetanus.

William Ewart supports Captain Oswald Smith's method and says that the artificial oxygen emphysema is capable of rescuing men from incipient gangrene and suggests other diseases in which the method might be tried, *e.g.*, cancer.—B.M.J. i./17,702.

Intra-abdominal use of oxygen in tuberculosis. In tuberculous peritonitis injected intraperitoneally until the distension by the gas corresponded with the previous distension by fluid.—L. i./09,1543.

For poisoning by asphyxiating gas subcutaneous injection of oxygen advised *vide* Poisons at end under par. Gas. Trench feet were treated by injecting Oxygen subcutaneously, see Trench Foot, Therap. Index.

Tuberculous affections treated by inflation with Oxygen. Fluid is first aspirated from cavity.—E. Rost, B.M.J. ii./21,978.

Anoxæmia is the only indication for Oxygen therapy. Oxygen should however be given as a routine in all types of pneumonia. The intra-nasal method of administration best.—G. Bourne, Pr. Jan. '24,43.

Atmospheric Pollution.—Its causes and prevention. (See Vol. II.)

Leonard Hill's Oxygen Mask is of celluloid with a curtain of washable material and heating box for evaporating alcohol and adding vapour of alcohol to the oxygen. (The common idea that the processes of combustion in the body are accelerated by breathing oxygen is erroneous.)—B.M.J. i./12,71.

Haldane's Oxygen Apparatus for inhalation. Improved face piece and bag to attach to cylinder.—B.M.J. i./17,181; ii./19,65.

Pleurisy treated by injections of air.—B.M.J.E. ii./11,75.

Oxygen and Alcohol Inhalation.—Sir W. H. Willcox has advised as cardiac stimulant the use of Alcohol Vapour mixed with Oxygen. A wash-bottle is used, the Oxygen passing by the inlet tube in a rapid stream, dipping about half an inch or so below the surface of the contained Absolute Alcohol. At ordinary temperatures the Oxygen bubbled through the Alcohol would contain from 4 to 5% of Alcohol vapour (from 1 to 2 grains of Alcohol per-litre). After from three to five minutes the full therapeutic effect is obtained, and lasts for several minutes. In cases of severe cardiac failure the mixture of Oxygen and Alcohol vapour should be given for five minutes every half hour. The Alcohol vapour is absorbed by the lungs and carried direct to the heart, on which it produces its direct action. The administration is pleasant, non-irritating and invigorating to the patient. Has been used in pneumonia with cardiac failure, cases of heart failure following Chloroform anæsthesia and various surgical operations, angina pectoris, asthma with cardiac failure, septicæmia, typhoid fever, myocardial degeneration, dilatation of the heart, valvular lesions of the heart, collapse after epidemic diarrhœa, etc.—B.M.J. ii./10,1408 to 1411. Apparatus to give varying dose percentage of Alcohol.—B.M.J. ii./10,1562,1658.

Liquid Air.

Consists mainly of oxygen and nitrogen, and when freshly prepared is a nearly colourless liquid boiling at—190° C. As the more volatile Nitrogen evaporates the temperature rises and the liquid assumes a bluish tinge,—the colour of liquid oxygen. With the exception of oxygen and chlorine, which has a yellowish tinge, most gases are colourless in the liquid condition.

Uses.—Nævi have been treated with it.

For a description of Air liquefying apparatus, Vacuum Vessels, Thermos Flasks and Hydrogen liquefying apparatus see Vol. II.

Nitrogen. N=14·008. Nitrogen is a colourless, odourless, tasteless gas constituting about 77% by weight (79% by volume) of the atmosphere. Nitrogen prepared from the atmosphere contains a small amount of **Argon** *q.v.* 1 litre of Nitrogen weighs at 0° C. and 760 mm. pressure 1·25072 Gm. It is only slightly soluble in water. The Nitrogen group of elements includes Nitrogen, Phosphorus, Arsenic, Antimony, and Bismuth. These are in combination sometimes trivalent and at others pentavalent (Bismuth in its well characterised inorganic compounds is always trivalent—but in organic compounds also pentavalent).

The treatment of hæmoptysis in phthisis by **artificial Pneumothorax** consists in introducing Nitrogen between the two layers of the pleura through Saugman's or K. Peterson's needle (described), and thus inducing collapse of the lung. There is no chosen spot for the puncture,—it is commonly made in one of the axillary lines in the seventh or eighth intercostal spaces. The aim is to find a spot where the lung is healthiest and to avoid the neighbourhood of cavities. A hypodermic injection of Morphine is desirable ½ hour before the operation. A local anæsthetic such as Eucaine is also advisable. The quantity of Nitrogen or air injection is 200 to 300 Cc. Oxygen has also been suggested, but animal experiments were not in favour of its use.

Pneumothorax Apparatus. Many hundreds of Nitrogen injections have been made.—L. ii./11,145 *et seq.*; ii./13,1627. See also B. Morriston Davies, B.M.J. i./14,897.

Pulmonary tuberculosis treated by Nitrogen Compression three separate injections of 500 Cc.—G. Lucas, B.M.J. ii./15,211. See also L. ii./23,899.

H. Batty Shaw recommends artificial pneumothorax in the early stages of consumption.—Pr. Feb. '24,107. *Further refs. last Edn.*

Active Nitrogen.

The Hon. R. J. Strutt has shown that Nitrogen, under the influence of an electric discharge, assumes an active state in the same way possibly as Oxygen does in the form of Ozone. The Nitrogen in the process acquires luminosity —a golden glow. High tension electric discharges from a Leyden Jar in certain circumstances appear to split up the Nitrogen molecule into atoms. The reunion of the atoms is accompanied by this light emission.

This active Nitrogen is reactive with Carbon Compounds. With Acetylene it produces a lilac colour—characteristic of burning cyanogen. Chloroform reacts with similar colour, Hydrocyanic Acid is produced. With Carbon Bisulphide a blue deposit forms which is Nitrogen Sulphide. Carbon Monosulphide is produced simultaneously. Mercury produces Mercury Nitride. Monatomic Nitrogen may possibly play a part in the formation of Protein in plant life—through the medium of bacterial agents.—L. i./13,1469.

PANCREAS.

In the pancreatic juice of man four distinct digestive ferments are believed to be contained, viz. :—

1. **Trypsin.**—A proteolytic ferment acting in an alkaline medium. Converts protein, albumen, *e.g.*, casein of milk and fibrin, into peptones.
2. **Amylase (Amylopsin) or Pancreatic Diastase.**—Converts starch into dextrin, maltose and dextrose.
3. **Lipase (Steapsin).**—A lipolytic ferment (emulsifies fats).
4. **A Milk-curdling Ferment, Rennin**—converting casein into a form of peptone.

The idea that Rennin is present in the Pancreatic Juice is not held by many (vide Bainbridge and Menzies, 'Essentials of Physiology') who consider that Trypsin is the milk-curdling function. The presence of Rennin would seem to be unnecessary in view of the active milk-curdling property of the gastric juice.

For invalids, aged persons, and those suffering from weak digestion, or those prostrated by fever or exhaustion, preparations of the pancreas of the pig (an omnivorous animal) may be employed, by means of which food may be partially or wholly digested previous to administration; their nutrition is thus maintained, and the stomach has time to regain its powers of digestion.

These preparations may also be given internally in cases of dyspepsia and defective nutrition.

The pancreas plays an important part in enabling the organism to resist infection, and the spleen is said to assist by producing a hormone which activates trypsinogen and raises the phagocytic index.

Diet in gout.—Pancreas and Thymus Sweetbreads are the foods richest in purins. They are frequently advised for invalids' diet. A. P. Luff says that, on the ground of Walker Hall's work, sweetbread is reasonable food for gouty patients, since its nuclein portion is only slightly absorbed. Thymus contains principally Adenin which is rapidly excreted and the pancreas contains mainly guanin, an amino purin incapable of increasing the urinary purin output and of exerting any injurious effects on the tissues. A. E. Garrod holds, however, that as it has been shown that feeding a healthy man on these foods is followed by a much increased excretion of uric acid—an increase less pronounced in the case of a gouty subject, it would appear desirable to eliminate these foods.—L. i./13,1793.

Neurasthenia, gastric neuralgia and allied disorders are often the product of auto-toxæmia arising from intestinal stasis, and not, as is generally thought the intestinal stasis the result of neurasthenia. Craik Taylor writes details of a case,—a victim of constantly recurring epileptiform seizures which had been treated with Bromides to saturation. It was diagnosed to a toxic cause as there was slight constipation and intestinal dyspepsia. Bromides were stopped and treatment with digestives and laxatives satisfactory.

Cushing showed that the posterior lobe of the pituitary has an inhibitory action on the oxidation of carbohydrates, and is thus antagonistic to the pancreas which is concerned in the oxidation of carbohydrates. For therapeutic use, therefore, a pancreas should be used that has previously been activated by removal of the posterior lobe of the pituitary.—Pres., Apl., 1913.

Pancreatinum, U.S.

Dose.—2 to 4 grains (0·12 to 0·25 Gm.).

A cream-coloured amorphous powder, slowly soluble in water, and containing not more than 10% insoluble; insoluble in alcohol; consisting principally of amylase, trypsin and lipase, obtained usually from the hog. It digests albuminoids and converts, if of U.S. Standard, not less than 25 times its weight of starch into soluble carbohydrate. Assay process is provided.

Fr. Cx. states it loses its activity on warming solutions of it above 50° C.

Its peptonising action is best in neutral or very slightly alkaline or very slightly acid solution.

The Assay process provides for conversion of 12½ times its weight of dried fibrin or 50 times its weight of fresh fibrin.

Pancreatin Tablets, 2½ grains, with Sodium Bicarbonate, are prepared. One is sufficient to peptonise half a pint of milk.

Liquor Pancreatis, Pancreatic Solution (*Off.*).

Dose.—1 to 2 drachms (4 to 8 Cc.).

This solution contains the amylolytic, the proteolytic, and the milk peptonising properties of the pancreas, and is made by extraction of the fresh pancreas of the pig, freed from fat and external membrane.

The pancreas is sometimes called the 'sweetbread,' but the sweetbread known to cookery is the thymus gland of the sheep, and *not* the pancreas, which, being tough and stringy, is inferior in value to the sweetbread of the throat for cooking.—Ph.

Pancreatic Juice, obtained in its inactive form from the pancreatic duct, acquires powerful proteolytic activity by mixing with it a soluble calcium salt and incubation.—B.M.J. ii./06,1787.

Test.—Should peptonise 27 (B.P.'98,40) times its volume of milk.

Incompatibility.—Broadly speaking we found that the following—Alum, Copper Sulphate, Ferric Chloride, Zinc Bromide, Zinc Sulphate and Syrup of Ferrous Iodide destroy the proteolytic action of the ferment. Acids generally are incompatible.

For details of inhibition of Amylolytic Activity, *see Vol. II., cf.* also **Enzyme Action**, p. 660.

All the liquid preparations of the combined ferments of the pancreas and the stomach are quite devoid of the ferments in question after two or three weeks Pepsin in a slightly acid medium gradually destroys pancreatic ferments.—C.D.i /08,133.

Glycosuria.—In certain forms of severe glycosuria depending on excessive activity of the liver Pancreatic preparations are valuable.

Pancreatic juice is the digestive fluid *par excellence.* Many animals are void of a gastric digestion, but all have something corresponding to pancreatic juice. Dextrose, as far as experiments go, is the best tissue food. The internal secretion of the pancreas determines its utilisation by the organism.

Insulin *is dealt with at end of this chapter.*

In chronic pancreatitis, Keratin-coated capsules of pancreatic extract may be employed with advantage before the operation and also in cases unsuitable for operations.—Whitla, Pract. Med.

Pancreatin should be given in special coating and *towards the end of the normal period of gastric digestion —about two or three hours after a meal.*—Prof. Diner, Jl. A.M.A. per Pres., Feb. 20.

In *sprue,* Pancreatin in 5 to 10 Gm. doses with 20 to 40 Gm. Calcium Carbonate, three times a day 2 hours after food, has been given with success. The treatment is based on results of experiments, which showed complete absence of pancreatic ferment.—T. R. Brown, Jl. Trop. Med., April. 1, 1921, per T. D. B. 18/21,50.

Ⓟ ✱**Trypsogen** (T.M. 274836) **Tablets.**—A proprietary preparation for the treatment of diabetes said to contain the enzymes of the Islands of Langerhans, tryptic and amylolytic ferments, also gold bromide $\frac{1}{100}$ grain and arsenic bromide $\frac{1}{200}$ grain.

Glycerinum Pancreatis, *Martindale,* a digestive preparation made from the pig's fresh pancreas.

Dose.—1 to 2 drachms (**4 to 8 Cc.**), equivalent to ¼ to ½ drachm of the official liquor.

Liquor Pancreaticus (✱Benger's : T.M. 321220).

Dose.—1 to 2 drachms (**4 to 8 Cc.**) in water with meals to aid intestinal digestion, or with farinaceous gruel, when cool enough to sip. As an addition to nutritive enemata, a dessertspoonful should be added to beef tea or milk gruel just before its administration. Will not keep diluted, and presence of acidity or heating over 140° F. destroys the ferment.

N.F. gives the following :—Triturate Pancreatin (U.S.) 128 grains, with Sodium Bicarbonate 6 drachms, and Water 10 ounces, add Alcohol (U.S.) ½ ounce, Compound Spirit of Cardamom N.F. ½ ounce, and Talc 120 grains. Shake well and filter, adding Water to 12 ounces, then Glycerin 4 ounces.

Each drachm represents 1 grain of Pancreatin.

Spiritus Cardamomi Compositus. Compound Spirit of Cardamom, N.F. Dissolve Oils of Cardamom 4, Caraway 1·5, Cinnamon 1, in Alcohol (U.S.) 1000, add Glycerin 130 and finally Water to 2000.

Peptonised Milk (*v. also* Peptonising Powders, *infra*).

Mix two-thirds of a pint of fresh milk with one-third of a pint of water, and warm in a saucepan to a temperature of about 140° F. (or the diluted milk may be divided into two equal portions, one of which may be heated to the boiling point and then added to the cold portion, the mixture will then be of the required temperature). Add two teaspoonsful of Liquor Pancreatis, and half a level teaspoonful of sodium bicarbonate. Pour the mixture into a covered jug and place in a warm situation for ten to twenty minutes, then boil the product. It can then be used like ordinary milk. **Gruel** can be similarly treated. *See also* Enemata and Peptonoids of Beef.

In the place of the water half a pint of lime water may be used to the pint of milk. The preparation if desired for early use may be kept at 15° C. for three or four hours ; need not necessarily be boiled.

Peptonised Beef Jelly and **Chicken Jelly** (Benger).

Restorative extracts of beef and chicken containing much of the fibrin converted into peptone or partially digested by trypsin.

Peptonising Powders.

Pancreatic enzymes mixed with sodium bicarbonate, in glass tubes. Place the powder into a clean quart bottle with ¼ pint of cool water, add a pint of fresh milk, and shake. Place the bottle in warm water for *ten minutes*, then pour the milk into a saucepan and heat quickly to boiling and allow to cool sufficiently for use. If desired, smaller proportional quantities may be utilised.

Uses.—In gastric ulcer, intestinal catarrh, for infants' use generally—and in all forms of weakened digestive functions.

Peptonising Powder for humanising Milk. *Martindale.*

To peptonise milk and simultaneously to increase the Lactose content, Lactose 400 grains containing a small proportion of Pancreatin and Sodium Bicarbonate may be added to ½ pint each of milk and cold water mixed and three to four tablespoonsful of cream. Allow to stand at about 40° C. for about 15 minutes and boil or heat the mixture in such a manner that it shall take ten minutes to reach the boiling point. Milk so treated must be kept in a cool place. To be slightly warmed again on feeding. In some instances a further dilution, *e.g.*, milk 1 to water 2 may be necessary. The result very closely approximates 6·3% Lactose, *i.e.*, the usual content in human milk.

✱**Chologestin** (T.M. 293202).—*Dose.*—½ ounce (**15 Cc.**) well diluted after each meal. Children in proportion.

A proprietary stated to contain Sodium Glycocholate 2 grains, Sodium Salicylate 2½ grains, Pancreatin 5 grains, and Sodium Bicarbonate 5 grains in each ½ ounce.

Uses.—In conditions of intestinal putrefaction, auto-toxæmia and indicanuria. The urine is to be tested for Indican by the Permanganate Test, *cf. Vol. II.*

It is held that by the combined administration of pancreatic and bile extractive both are carried safely through the stomach without loss of activity and hence relieve flatulent distension and prevent gall-stone formation.

✱**Tablogestin** (T.M. 322701).—Tablets of the above, 3 tablets = ½ ounce.

Trypsin. *Dose.*—8 to 20 grains (**0·5 to 1·2 Gm.**).

Trypsin is stated to be produced simultaneously with Amylopsin, and from the same cells in the pancreas. This ferment is prepared commercially in the form of whitish powder, possessing an odour like pepsin. It changes proteins into peptones in alkaline media. It is inactive at 75° C. One part should peptonise about 100 of coagulated egg albumen in 1½ hours.

Soluble slightly in water, more so in glycerin.

It is administered to assist digestion in diabetes, and it is occasionally employed for peptonising milk. It may be given in Formagules. Commercially it contains some Amylopsin. It was given hypodermically and internally and per rectum in cancer but the method fell entirely into disrepute.

Preparation.—For details see last Edn., p. 620.

For Muller's Trypsin Test for determining the activity of Trypsin Preparations, see Vol. II.

✱ **Holadin** (T.M. 300980) Capsules contain an extract of the entire pancreas, said to represent all the constituents both of the digestive and intestinal secretions.

Capsules of Holadin 2½ grains and **Bile Salt** 1½ grains are also supplied.

INSULIN.

Dose.—About 20 units per diem for a mild or moderately severe case. This amount should preferably be given in two or three injections, each injection preceding, by about 15 to 30 minutes, one of the principal meals. Severe cases may receive double or more.

Each unit (for further consideration of 'unit' see below) should enable the patient to take from 1 to 4 Gm. additional carbohydrate, or its equivalent, with the next meal, without excreting sugar. The object is to keep the blood sugar throughout the day at, or just above, normal.

The effect on the blood sugar is not exerted immediately, hence the injections are given so that their effect occurs during the period of assimilation of carbohydrates.—Banting, Campbell and Fletcher, B.M.J. i./23,8.

Manufacture.—

Brit. Patent, No. 203,778. *Complete Specification accepted* Sept. 13th, 1923. 'A METHOD OF PREPARING EXTRACTS OF PANCREAS, SUITABLE FOR ADMINISTRATION TO THE HUMAN SUBJECT.' By F. G. Banting, J. B. Collip and C. H. Best, British subjects, all of Toronto University.

The following is an abstract:—A pancreas extract containing the anti-diabetic principle or hormone. It is essential for intra-

venous or subcutaneous administration that the anti-diabetic principle be purified from the enzymes, proteins, lipoids and salts. Self-digestion (proposed by earlier workers) would allow the enzymes to destroy the active hormone. In this new invention Alcohol is used, which inhibits deleterious action of the enzymes on the hormone; proteins, salts and other substances are removed, as far as possible, from the solution by precipitation. An *improved* method is also mentioned in the specification, which consists in finely dividing (mincing) the pancreas and mixing it with Alcohol; straining or filtering the mixture to separate inert gland tissue; treating the filtrate with several volumes of Alcohol; removing the precipitate by filtration and concentrating the filtrate; treating the latter with Ether; eliminating the Ether; adding Alcohol; centrifugalising the mixture to form into layers, so that the uppermost one consists of Alcohol holding the hormone in solution, the lower layer or layers consisting of flocculent protein, salt solution, and salt crystals; subsequently removing the uppermost layer and treating it with several volumes of 95% Alcohol, to separate by precipitation any substances which may still be present with the hormone; then distilling off the Alcohol, dissolving the hormone in distilled water and concentrating the aqueous solution, sterilising it and adding 0·5% Trikresol.

The whole theory of *hyperglycæmia* is dealt with in the patent which need hardly be detailed in our pages. It may be mentioned, however, that the communicators specifically say that prior to its conversion into glycogen, or its oxidation, glucose (normally) probably becomes altered in chemical structure, so as to be more reactive. In diabetes, the sugar absorbed from the intestine is no longer changed into an active form, therefore it cannot be stored in the liver as glycogen, nor oxidised in the tissues—hence the hyperglycæmia and the glycosuria.

The relation of the pancreas and diabetes was established by the experiments of Von Mering and Minkowski; extirpation of the pancreas in dogs was followed by persistent glycosuria. The pancreas consists of two types of tissue—the *acinar*, secreting the pancreatic juice (*external* secretion), which reaches the intestine through the pancreatic duct, and groups of cells, known as the '**Islands of Langerhans.**' The latter show pathological changes in varying degree, in most cases dying of diabetes mellitus. Numerous workers believed that this insular portion provided an *internal* secretion, needed to normal carbohydrate metabolism, and they tried to produce extracts of it for treatment, but these extracts contained toxic substances, which resulted in their causing local irritation, and they were clinically unsuited.

The communicators proved by experiment that the Islands of Langerhans contain a substance which lowers the blood sugar, and diminishes or abolishes excretion of sugar in the urine of diabetic dogs. Subsequently, by extracting fœtal or adult normal pancreas with Alcohol, they made an extract which caused a

owering of blood sugar, and the glucose in the urine, when injected nto a boy suffering from the disease. The Alcohol evidently pre-vented the destruction of the principle by the digestive ferments.

In short, "it has been proved, for the first time in the history of medical science, that a product can be made from pancreatic glands of mammalia, which will save and has saved the lives of a number of diabetic patients, many in a state of coma before the substance was given."

On injection, it converts glucose into the active form, and if given at proper intervals blood sugar is maintained at normal level, and the urine remains free of sugar. Fat is completely oxidised. Acetone bodies disappear from the urine and diabetic acidosis and coma are prevented—a restoration to normal metabolism.

It is also patented in U.S.A., Canada and other countries.

A review of the manner of making the preparation. Extraction with 80% Alcohol and subsequent purification (Modified **Scott's Method**). Banting and Best have abandoned the principle from which they started and which they never proved!—Ff. Roberts, B.M.J. ii./22,1193. H. H. Dale in reply to this criticism sends a good letter, pointing out that the work he attacks was the first unaided attempt at research by two young enthusiasts. One of them spent half the time of the war as a combatant, and the rest, after being seriously wounded, as a medical officer in England —they went on where Scott stopped.—*ibid*, 1241.

The presence of a hormone in the pancreas capable of alleviating the symptoms of diabetes has therefore been established. To F. G. Banting is due the credit of suggesting that the destructive action of trypsin and other proteolytic enzymes in the pancreas might be circumvented by taking advantage of the well-known fact that the cells which secrete the digestive enzymes become completely degenerated some weeks after ligation of the pancreatic ducts, whereas those of the Isles of Langerhans, which apparently secrete the antidiabetic hormone, remain more or less intact. Banting observed the effects produced by injection of extracts on the percentage of sugar in the blood, as well as on the total sugar excretion in the 24 hours. The untreated, depancreatised dog seldom lives 3 or 4 weeks, whereas with the extracts one was kept alive for 10 weeks in good condition. The preparation is purified by fractional precipitation with alcohol (Collip, Trans. Royal Society of Canada, 1922, Vol. XVI., Sec. V.), and is assayed pharmacologically.—J. J. R. Macleod, B.M.J. ii./22,833, 882.

Chemically Insulin has a marked tendency to become adsorbed in any precipitate formed in its solutions. A minute dose is active. When a solution of impure Insulin is saturated with Ammonium Sulphate the activity passes into the precipitate. When **Picric Acid** is added to the relatively impure substance a very insoluble precipitate is formed containing all the Insulin and this can be converted into a soluble hydrochloride. (For Dudley and Starling's method by cold Alkaline Alcohol, see Bioch. Jl. 1924, 18, 147; Pres. May, '24, 176.

It is rapidly destroyed by Trypsin, also Pepsin. This throws light on the fact that Insulin has very little, if any, effect when given *per os*. It is

stable to heat when its solution is strongly acid. It survives heating to 100° C. for half an hour. It does not approach the chemical simplicity of Adrenalin or even Thyroxin.

Distribution in nature. In higher animals it seems to be strictly limited to the islets of Langerhans in the pancreas. It is to be found also in certain fish. There is evidence also of the presence of something allied in yeast.—H. H. Dale, L. i./23,989.

Preparation by Aqueous Extraction.

From an extract of the pancreas made with aqueous Formic Acid at −3° C., proteins and Insulin are precipitated as picrates. The latter is extracted by Acetone and is isolated on dilution with water. Alcoholic Acid converts this to the hydrochloride, which, although more cheaply and quickly prepared, appears as satisfactorily clinically as Insulin obtained by the Alcohol method. Average yield 300 rabbit units per kilo of pancreas.—E. C. Dodds and F. Dickens, L. i./24,330.

By adding 5% of Paraldehyde to the extracting fluid the yield was increased to 535 rabbit units; by distilling off the Acetone this was again increased to 1,040 units, and finally by eliminating the preliminary aqueous extraction and preparing the picrates simply by grinding the pancreas with solid Picric Acid a yield of 1,845 units was obtained—the highest recorded yield. The time of the complete process is reduced by this method to about one day.—E. C. Dodds and F. Dickens, Brit. Jl. Exper. Path. Apl. '24, per L. i./24,909.

Chemical Examination of Insulin.

We found the following data on examination of a Commercial brand of Insulin.

(20 units per Cc.. *Issued*—Dec., 1923).

Appearance.—Pale brown. Clear.
Odour.—Slightly phenolic.
Reaction.—Slightly Acid.
Specific Gravity.—Practically 1. (Found 1·002).
Residue on Evaporation.—0 45%.
Inorganic Matter (Ash).—Practically nil.
Alcohol.—Gives no ppt.
Test for Proteins.—A slight reaction was obtained using the general colour reactions, *e.g.*,
Biuret Test.—A slightly deeper blue colour than blank.
Nitric Acid.—Warmed, gives pale yellow colour turning orange with ammonia.
Millon's Reagent.—Red colouration.

Units.—The methods for determining these are not considered accurate, and the reactions of patients vary within wide limits; great care has therefore to be taken. The directions on the bottles of the injection should be carefully read.

A unit was originally taken as the amount of Insulin which on subcutaneous injection can lower the percentage of blood sugar to 0·045 within four hours in a rabbit weighing about 2 kg. from which food has been withheld for sixteen to twenty-four hours. Such Insulin was first prepared so that 1 Cc. contains one unit.

Subsequently the U.S.A. makers brought in a unit with approximately *one third* of the Toronto unit, and the Medical Research Council adopted the U.S.A. unit—*i.e.*, *three* units, as at present defined, produce this reduction in blood sugar (to 0·04%) with standard conditions (in 2 hours). The average single dose for an adult is 10 New Style units, *i.e.*, 3 to 4 times the quantity for the rabbit. Think in units rather than so-called 'doses.'—M.R.C., B.M.J. i./23,737. See also Prof. H. Maclean. L. i./23,1044.

Five kilos of beef pancreas yield about 200 to 400 units of Insulin.—H. F. Moore, L. i./23,715.

The process of manufacture and purification of Insulin was improved in the laboratories of the National Institute of Medical Research to the extent that finally about 3 mgr. (1/20 grain) represents an average human dose.—L. i./23,861. In other words 1/200 grain = 1 unit.

Technique of Injection.—The injection is given subcutaneously in the upper arm. In cases of extreme collapse, it can be used intravenously without danger. If given *per os* it has no demonstrable action. For diabetic coma 20 units immediately. *Glucose should be given simultaneously,* either *per os,* or by stomach tube, or intravenously. In all cases give fluid at the same time.

A solution containing 1·8% Sodium Chloride and N/1000 Sodium Hydrate mixed with equal parts of a commercial brand of Insulin, renders injection painless.—O. Leyton, L. i./24,1082.

Suitability of the Case.—The patentees point out that the indiscriminate use of their product is a source of danger. All cases, except those suffering from severe acidosis and coma should be put to bed and given a basal maintenance diet—protein, in sufficient quantity, to replace the daily wear on the tissues, approximately 0·3 Gm. per lb. body weight. Additional calories in food are supplied by carbohydrates and fat in proper proportion to prevent production of acetone bodies. If the urine of patient becomes sugar free on this, it should be gradually raised to an adequate diet for his ordinary duties. If he remains aglycosuric the treatment with Insulin is not indicated. 75% of diabetics can be controlled by diet. If at the end of the week's treatment on basal diet, the urine is not free of sugar, the patient requires Insulin.

There is no evidence as yet that the treatment is curative. It is not recommended unless the treatment can be continued. The initial stages of treatment should be carried on in, or in connection with, facilities for blood and urine sugar estimations.

Contraindication.—It is dangerous in cases of so-called 'renal glycosuria' or **diabetes innocens,** in which the kidney fails to hold back the normal amount of glucose in the blood, *i.e.*, the patient is already in a condition of persistent hypo-glycæmia.

Hypoglycæmia: Effects of excessive dose.—There is a rapid fall of blood sugar following a single injection. This blood sugar content reaches a low point in 2 to 8 hours, and tends to return to the original level in 12 to 24 hours. When the blood sugar percentage falls to 0·07 (the normal being 0·1%) under a dose the patient may first complain of hunger, weakness or fatigue; he may even show signs of a definite neurosis with loss of emotional control, such as crying spells. A lowering to 0·05% produces very acute distress or mental disturbance.

These reactions are relieved by food; 50 to 100 Cc. of orange juice is effectual or 5 to 25 Gm. of Glucose with the orange juice.

When the patient is unconscious give 1 Cc. Epinephrin solution (1 in 1000), intramuscularly, followed by Glucose *per os.*

Nurse with care, because reactions may occur during sleep.—Banting and co-workers.—B.M.J. i./23,8.

The Medical Research Council directions add, that, *if necessary, 5 to 20 Gm. of glucose in 50 to 100 Cc. of diluent may be given intravenously, and that out-patients under treatment should carry sugar with them to be eaten at the first sign of these hypoglycæmic reactions.*

In one case, 25 units subcutaneously reduced the fasting blood sugar from 0·181 to 0·07% in 2 hours 20 minutes, and abolished a moderate glycosuria. In another case, 16 units reduced it from 0·216 to 0·117% in $1\frac{3}{4}$ hours, and abolished a heavy glycosuria.—H. F. Moore, L. i./23,715.

Banting, Best, Collip, Campbell and Fletcher published a preliminary report on the treatment of severe cases of diabetes mellitus with Insulin.—Can. Med. Assn. Jl., March, 1922. Excretion of sugar in the urine decreased and sometimes completely cleared up. Coincident with this decrease in sugar excretion was a lowering in blood sugar level. This could be brought to normal, it was found, by adjustment of dosage. Ketone bodies disappeared from the urine in 24 to 48 hours. An account of the first 50 cases treated shows as follows :—On the first or second day of treatment if sufficient Insulin is given, the urine becomes sugar-free, and on the second or third day, ketone-free. Patients become cheerful and interested, hunger is replaced by appetite, thirst is lessened, œdema (which is common) disappears, and weight increases. As originally stated, ketonuria, under Insulin, was relieved in a striking manner. Insulin, indeed, is even hopeful in *diabetic coma.* It is given, in such cases, either subcutaneously or intravenously, followed by subcutaneous injections. The dose was usually, though not always, far in excess of requirement. The danger of a hypoglycæmic reaction is guarded against by sufficient Glucose given intravenously at the same time. Diabetes in children, it is stated, is readily responsive to treatment.—B.M.J. i./23,8.

The ***estimation of blood sugar*** can be performed by any medical man with a minimum of chemical knowledge. The equipment costs a few pounds.—Prof. H. Maclean, L. i./23, 1043.

For Method of conducting the Estimation, see Vol. II.

Clinical Experience in English and Scottish Hospitals in less than 50 cases. Commercial products equal those made in laboratories of medical schools attached to hospitals. One worker found that 1 unit of Insulin could provide for the consumption of 2 Gm. of carbohydrate taken as such in the food of a completely diabetic patient. This is equivalent to 4 Gm. of protein, but no rule can be laid down. In this paper the subject of various forms of *diabetic coma* is dealt with. The consideration of *hypoglycæmic collapse* is of interest—an entirely novel conception that has come into pathological thought, as the result of experience

with Insulin. It is caused by the artificial lowering of the blood sugar to half its normal level, and it is at once relieved by giving sugar.—Med. Res. Council Rept., B.M.J. i./23,737.

Influence of Insulin on acidosis and lipæmia in diabetes. When given *together with carbohydrates* to patients with diabetic acidosis, verging on coma, there is a spectacular effect. Importance of combining the two. If given alone it may increase the acidosis.—Prof. J. C. Meakins and co-workers, B.M.J. i./23,847.

Prof. Maclean insists that diabetes is not only a carbohydrate derangement. Defects in fat and protein metabolism may play an equally large part in the malady. In the estimation of blood sugar 0·2 Cc. of the blood is used.—Review of book, B.M.J. i./23, 974.

Inunction of Insulin with Lanolin and with lard—rabbit experiments. The conclusion is that apparently Insulin can be introduced by this measure. Crude Insulin extracts could be used.—S. V. Telfer, B.M.J. i./23,715.

The normal blood sugar in man and animals has a lower rotatory power than would be given by the α-β equilibrium form of glucose as deduced from the copper reduction value. It is suggested that normal blood sugar is γ glucose, and that it is absent in amounts capable of detection in diabetes mellitus, and that α-β glucose cannot be directly stored or utilised, but that an enzyme is responsible for the conversion of it into γ glucose. It is thought that the effect of Insulin is to activate the enzyme responsible for the conversion of α-β glucose into γ glucose.—L. B. Winter and W. Smith, B.M.J. i./23,12,479.

There is *no* evidence of the existence of γ glucose as a compound of normal blood. Winter and Smith's theories are considered as without experimental foundation.—J. A. Hewitt, B.M.J. i./23,590.

The Zymase group of ferments might have properties similar to Insulin —O. Leyton, B.M.J. ii./22,1144,1233.

Insulin isolated from *yeast*. An extract of yeast has an effect similar to Insulin when tested on animals and diabetics.—Winter and Smith, B.M.J. i./23,711,819.

Yeast possibly acts on sugar by converting it first into an unstable form. It is by no means certain that diabetes is invariably a disease of the pancreas.—Leader, L. i./23,708.

Prof. Hewitt's further criticism of Winter and Smith's work.—B.M.J. i./23,994.

GENERAL REFERENCES.

Leader on early work—a useful summary.—L. ii./22,398.

Possibilities of Insulin. Medical Research Council arranged for trials at hospital centres.—B.M.J. ii./22,991.

Query as to whether animals who have suffered pancreatectomy are comparable with diabetics.—A. P. Thomson, B.M.J. ii./22,948.

Pancreatic Extract made from fresh pig pancreas obtained from the slaughter-house, the pigs having been without food for 24 hours before being killed. Fat and connective tissue is removed and the pancreas cut up and extracted with Alcohol on the water bath at 60° C. one hour, then extracted (distilled) *in vacuo*. Finally on evaporation 70 to 80 Gm. of residue obtained from 12 lbs. of pan-

creas. It is stable in presence of 0·2% Hydrochloric Acid but unstable in alkali. The preparation was found active in combating diabetes.—R. L. Mackenzie-Wallis, L. ii./22,1158.

Prognosis in Diabetes Mellitus.—A degree of hyperglycæmia may still be present, even when sugar no longer appears in the urine. Response to treatment to be studied.—D. M. Lyon, L. i./22,1043.

Recommendations in diabetes mellitus. If sugar found and it then disappears, determine if the power of sugar destruction is diminished; give 100 Gm. glucose in 1 litre of water before breakfast. If the power is diminished sugar is found in the urine ½ hour to 3 hours afterwards. If sugar destruction is normal the urine will be free from sugar.—R. T. Williamson, Pr. Oct. 1920, p. 233.

Small amounts of pancreatic extracts containing Insulin, made on the lines of Collip's method, used in a severe case, showed a certain amount of blood sugar to be metabolised in a manner resembling, or identical with, normal procedure. Insulin may be expected to make the dietetic treatment of diabetes a lighter burden, but will not eliminate the necessity of dietary regulation, and very likely will not even make it an easier task.—R. Carrasco-Formiguera, B.M.J. ii./22,1143.

That the injection of fresh pancreatic extract reduces sugar content of blood in normal animals, also temporarily improves glycosuria and hyperglycæmia following pancreatectomy, has been known for some time, but attempts clinically in diabetes ended in failure. Optimistic forecasts should be damped down.—P. J. Cammidge, B.M.J. ii./22,997.

Factors controlling the blood sugar content.—P. J. Cammidge, J. A. Cairns Forsyth and H. A. H. Coward, B.M.J. ii./21,586.

Drugs in Diabetes. Having in mind the depressing effect of *Atropine* on secretions of the body, this (as Belladonna Tincture) was tried in a case. Patient could take more carbohydrate, protein and fat and was able to follow his occupation. It has a pronounced influence on sugar content of the blood. Opium as routine treatment must be condemned. With regard to metals, *Colloidal Palladium* appears to be specially useful in hepatic glycosurias. Uranium Nitrate appears to act at first as depressant of the diastatic ferment of the liver like Palladium, but when continued for some time the effect is diminished. With regard to organotherapy, pancreas preparations *per os* may be actually harmful. With regard to Insulin, it probably has only a brief effect on food tolerance.—P. J. Cammidge and co-workers, L. ii./22,1324.

Insulin made by Cammidge in his own laboratory was found to be not a 'cure' for diabetes in the popular sense of the term—that the patient is able to resume unrestricted diet after such treatment. The effects thought to be only temporary.—P. J. Cammidge, B.M.J. i./23,787.

Insulin does not give the protein reaction (*cf.* our findings). The diabetic fails to store sugar, as shown by the blood sugar becoming excessive. He fails to burn sugar, as shown by his respiratory quotient being too low. The injection lowers his blood sugar and raises his respiratory quotient.—O. Leyton, B.M.J. i./23,707.

Injections of Pituitary given simultaneously with Insulin either reduce, or abolish or replace, by a rise of blood sugar, the fall due to Insulin. The work confirms, as is known, that in cases of pituitary insufficiency there is a raised carbohydrate intolerance.—Proceedings of Physiological Society, Feb. 1923, M.P.C. May 9/23, 369.

Three cases treated. It is unwise to give any carbohydrate at all, except that in vegetables, until the fasting value of the blood sugar has been below 0·12% for some considerable time.—G. Graham and C. F. Harris, L. i./23,1150.

A case is cited of a diabetic patient whose daily urine sugar content prior to treatment was 270 Gm., which fell first to 85, then to 60, 30, 15, 9 and 5 Gm. after Insulin injections twice daily were begun.—Chabanier, Lobo-Onell and Lambert, per P.J. i./23, 456.

Clams yielded Insulin. Collip suggested it must be present wherever Glycogen is found. Later he made it from yeast, confirming Winter and Smith, but this type differs, in that its action in lowering blood sugar is delayed, sometimes for a day or two. The same applies to Insulin-like substances from various vegetable sources styled *Glucokinin.*—Prof. Macleod, B.M.J. ii./23,165.

Diabetes mellitus. It is not the purpose of treatment to eliminate glycosuria in all circumstances. Liberal diet with slight glycosuria often beneficial.—Lenné, per Jl. Trop. Med., Sept. 16/22,298.

The treatment of diabetes—with special reference to Insulin.—Sir W. H. Willcox, Pr. Dec. '23,377.

Insulin greatly reduces the hyperglycæmic action of Adrenalin.—J. H. Burn, per Pres., Oct. 23,334.

The necessity for frequent estimations of the blood sugar during treatment is not regarded essential in ordinary cases. Test the urine with Fehling's solution. Do not attempt to get a constantly sugar-free urine—a trace of sugar in the morning is a safeguard.—A. Innes, B.M.J. i./24,55; Pres. May '24,216.

The **Glucose equivalent** (*i.e.*, the amount of Glucose which one unit of Insulin can metabolise) varies with the dose given and with the amount of carbohydrate in the diet. When carbohydrate ingestion is constant the Glucose equivalent per unit becomes progressively smaller as the dose is increased.—F. N. Allan, Am. Jl. Phys, '24, Jan., p. 275, per Pres. May '24,219.

Insulin is present in potatoes, rice, beetroot and celery. A substance having an Insulin-like action in reducing blood sugar has also been extracted from the kidney, spleen and muscle tissue of dogs and cattle.—C. H. Best & D. A. Scott, Jl. Metab. Research, Jan. 1923, per Pres. May '24,220.

PAPAIN.

Syn. PAPAYOTIN. *Dose.*—1 to 8 grains (0·06 to 0·5 Gm.).

Whitish, amorphous powder, prepared from the juice of the Papaw, *Carica Papaya* (*Passifloraceæ.*) 75% should be dissolved by absolute alcohol.

Papaw fruit, fresh, divested of its seeds, in shape like a vegetable marrow, is a refreshing dessert fruit, with flavour something like the melon. It is commonly used as a table fruit abroad. It is thought to have digestive properties. The author has imported the fruit '*canned*' in syrup. The tree is indigenous in India, East and West Indies, Hawaiian Islands, in Ceylon and other tropical parts.

Manufacture of Papain.—The fruit while remaining on the tree is lightly incised several times at intervals of 2 or 3 days with a bone knife and juice collected in calabashes containing a little water. The juice is rapidly dried—the coagulated milk being exposed to the sun or artificial heat on glass or linen frames at not exceeding 100° F., subsequently while still warm powder in a drug mill.

The natural colour of Papain is light brown. The bleaching of Papain is said to be a great mistake. Adulterants include bread, boiled rice, starch and the milk of gutta percha and the wild cactus.

The fruit is sometimes called the tree melon. The leaves are used for wrapping round fresh meat to render it tender. The juice of the fruit is also rubbed into meat for this purpose or a piece of the fruit is placed in the water in which the meat is boiled. A tree bears on an average thirty fruits a year and lasts some 5 years as productive and worth cultivation. A trace of formalin should be added to the juice as collected by scarification. A dozen fruits yield about ½ lb. of dried granulated crude papain at one tapping. Huybertsz found the Ceylon Papain will digest 200 or 300 times its weight of albumen, while West Indian only digests 75.—H. F. MacMillan, C.D., Jan. 30, 1915.

Assay.—Recent examination showed that 0·4 Gm. Papain will peptonise 100 Cc. of 4% Alkaline Casein Solution in 1 hour

Uses.—As a digestive in chronic cases of dyspepsia with acid eructations and painful gastric fermentation. It acts in acid, alkaline, or neutral media, has the property of digesting fibrin like pepsin (as much as 200 times its weight in some cases).

The Liquid preparations are suitable for use in cases of enlarged tonsils—after persevering treatment, improvement in nasal breathing can be observed—due to reduction of the swellings.

It has the property of curdling milk like rennet and might be used as a substitute for the latter.

Ulcers and fissures of the tongue have been painted with a solution of Papain 1 to 2 in 10 each of glycerin and water. It is a vermifuge destructive to ascarides and tænia.

Elixir Papain.—*Martindale.*

Dose.—1 drachm (4 Cc.) with meals.

Glycerinum Papain.—*Martindale.*

Dose.—1 drachm (4 Cc.) with meals as a digestive.

It has also been used as a pigment for chronic eczema and warts, and has been applied to diphtheritic exudation.

Tabellæ (of chocolate basis) contain 2 grains (0.12 Gm.).

Trochisci ½ grain (0·03 Gm.).

℞ ℙ1 **Trochisci Papain** ($\frac{1}{5}$ grain) **et Cocainæ** ($\frac{1}{10}$ grain). These, if slowly sucked, are useful for ulcers, warts or sores on tongue, &c.

ℙ1 **Pilula Papain Composita.**—*G. Ogilvie.*

Dose.—1 with meals. Papain 2 grains, Extracts of Nux Vomica $\frac{1}{3}$ grain, Belladonna $\frac{1}{6}$ grain, Aloes $\frac{1}{4}$ grain. A digestive laxative.

Pulvis Papain Compositus. E.L. *Dose.*—5 grains (0·3 Gm.). Papain 1, Sodium Carbonate 2, Sugar 2.

Liquor Papain et Iridin.

Dose.—2 to 4 drachms (8 to 15 Cc.). Papain 120 grains, Iridin 150 grains, Glycerin 2 ounces, Sherry 5 ounces, Chloroform Water to 1 pint. Macerate 7 days and filter.—From Ph. Form., 1911, p. 890 modified.

PARAFFINA.

The Paraffins used in Pharmacy are arranged herein in order of consistency, commencing with the Hard and following in rotation with Soft—vaseline and unctuous compounds, vaseline oils (thick fluids), Liquid Paraffin, and finally the light fractions known as Amyl Hydride, Petroleum Spirit, etc.

Paraffins from a Yorkshire coal seam. Six fractions ranging from 70° to 350° C. were examined.—J.C.S.T., Jan., 1912, p. 12.

Paraffinum Durum.—*Syn.* PARAFFIN WAX.

A mixture of several of the harder members of the paraffin series of hydrocarbons $C_{20}H_{42}$=282·436 to $C_{27}H_{56}$=380·583; obtained, by distilling shale, separation of the liquid oils by refrigeration, and purification of the solid product. Colourless, semi-transparent, crystalline, inodorous, and tasteless, slightly greasy to the touch. Sp. Gr. 0·82 to 0·94. Insoluble in water, slightly soluble in absolute alcohol, soluble about 1 in 80 in ether. It burns with a bright flame, leaving no residue. Hard paraffins are supplied with the following melting points:—100°, 104°, 110°, 115°, 120°, 125°, 127°, 130°, 135° F. (*Off.*). employs from 122° to 140° F.

U.S. has M.pt. 50 to 57° C. (122 to 135°F).

Ceresin. A hard white paraffin prepared from ozokerite or earth wax; has M.pt. about 130° F. When artificially coloured to resemble yellow wax it is sold as **Yellow Ceresin. Ozokerit** is a hard paraffin obtained from Galician deposits.

Paraffin Solid, Sterilised.

For subcutaneous injection in plastic operations this should be hard paraffin with M. pt. 110—115° F. *not an extempore mixture.* Used to improve the size and shape of the nose, ear, &c., where abnormal, also for injecting into cavities after previously swabbing out with antiseptic Lotion.

The injection should be made in a warm room to allow of the flow of the melted substance through the syringe needle.

In facial surgery.—S. Mort, L. ii./19,105.

Ozæna treated by injecting high melting paraffin into the nasal septum.—B.M.J.E. i./15,36.

Paraffinum Molle (*Off.*).—*Syn.* PETROLATUM, U.S. and PETROLATUM ALBUM, U.S., PETROLEUM JELLY.

A white or yellow semi-solid mixture containing some of the softer or more fluid members of the paraffin series of hydrocarbons $C_{15}H_{32}$=

212·331 to $C_{20}H_{42}$=282·436. Melts (*Off.*) at 42 to 46° C., or even somewhat higher (U.S. requires 38 to 54° C.). Is usually obtained by purifying the less volatile portions of petroleum.

Soluble in alcohol slightly, freely in ether and chloroform, insoluble in water. When melted, it mixes with oils, and many waxes, oleates, and oleic acid.

Soft paraffin is not readily absorbed, but is emollient, protective and useful for surface action, *e.g.*, for compounding with lead, mercury, zinc, and sulphur iodide.

Absorbtion.

It is commonly thought that Paraffins injected into tissues (as in Beck's Bismuth Paste) are not absorbed. It was proved in Germany that this only applies to hard paraffin.

Intra-articular injections of Vaseline admirable in certain cases of painful and grating joints including morbus coxæ senilis and dry traumatic arthritis. For a knee joint 15 Cc., for the hip 20 to 25 Cc. If the joint contains fluid its further secretion may only be stimulated by injection of Vaseline.—B.M.J.E. ii./13,78.

✱**Vaseline** (T.M. 12486) is a yellow soft Paraffin. This is filtered through animal charcoal, becomes **Vaselinum Album.**

This is the **Vaseline Officinale** or **Pétroléine** of the Fr. Cx.—that which remains over after distilling American Petroleum at 360° C. and purifying. 2 to 5% 'Paraffin' is directed to be added according to season or climate to improve its consistence.

Tests —It should be pointed out that the B.P.1914 omits the requirements of the B.P. '98 that Paraffinum Molle shall be "free from acidity, alkalinity, or any unpleasant odour or flavour, even when warmed to 120° F. (48·9° C.)." Vaseline complies with these requirements.

High Melting "Vaseline" is also prepared with M.pt. 46·1° C. (115° F.)., suitable for warm climates.

Unguentum Paraffini made with Hard Paraffin (M.Pt 54 to 57° C.) 27, Soft Paraffin 70, Beeswax 3, is suitable for use with the atmospheric temperature, 15° C. May be modified to meet the exigencies of climate and temperature.

A Hard Paraffin with somewhat low melting point, *e.g.*, 46 to 52° C. is best. Our experiments showed it is well to melt together and set aside to crystallise (or allowed to cool on the water bath) and then mill, rub down, or sieve again.

A small quantity of wool fat added to soft or liquid paraffins enables the production of a stable Emulsion, *vide* Vasenol.

Ceratum Petrolei is a firmer basis than the Soft Paraffin and is a good protective.

White Soft Paraffin 2 parts, Hard Paraffin (135° to 140°) 1 part. and Melt stir until cold in an evaporating dish.

'Collapsubes' of Vaseline with catheter and rectal attachments are suitable for uterine and rectal medication. The base may be medicated with antiseptics and astringents; for formulæ, *vide* Index.

Ceratum, U.S. White Wax 30, Benzoated Lard 70. Melted together and stirred until the cerate congeals. In hot seasons and warm latitudes, White Wax 50 may replace 50 of Benzoated Lard.

Paraffin Teatment of Burns.

Paraffin "No. 7" is made as follows:—

Melt Hard Paraffin 67·75 and add Soft Paraffin 25 and Olive Oil 5. Then mix in carefully Beta-Naphthol 0·25 dissolved in Eucalyptus Oil 2, after the mixture has cooled to about 55° C. (The original mentions Resorcin 0·25 to 1% as alternative and that a small quantity of Absolute Alcohol is to be used as solvent). The finished article melts at about 48° C.

Method of Use.—Wash the burns with sterile water, dry thoroughly for example with a fan and spray or apply the melted preparation carefully with a flat camel hair brush. Cover with a thin layer of wool and a second coating.

Severe burns accompanied by sloughing and in a very septic condition cleaned and became healthy. Cordite, Petrol and Liquid fire burns healed. Also suggested for frost bite.—A. J. Hull, B.M.J. i./17,37. Wounds and Burns treated—nothing so effectual. —E. F. Pratt, B.M.J. i./19,243.

Other formulæ.—No. 10 Red (containing scarlet), No. 12 Brilliant Green No. 13 Flavine Wax, No. 14 Dichloramine Wax, The No. 7 with preliminary painting of surface of the burn with 1 in 1000 Flavine gives the best results.—A. J. Hull, B.M.J. ii./17,788.

Ambrine (T.M. 380347). A similar preparation advised by B. de Sandfort (a compound of Paraffin with 5% Oleum Succini, L. i./17,318). Applied in similar manner.

Results better than those with Picric Acid. Pain alleviated, scar formation prevented. It has elastic and adherent properties.—B.M.J. ii./16,329,333.

Preparations similar to Ambrine used with advantage in eczema, varicose ulcers, neurodermatitis, intertrigo, fissures and chilblains. Paint on and cover with thin layer of cotton wool, then a second film of paraffin, cotton wool and bandage. Relieves itching.—B.M.J.E. ii./21,1.

Dental Wax. Hard Paraffin 1 ounce; Beeswax 6 ounces. melt together, add ½ ounce Alkanet and keep warm for two hours, then strain and add Tincture of Tolu 2 drachms, Otto of Rose 5 drops. Generally supplied in sheets 6½ by 3½ inches ***Use.***—The sheet is warmed over the flame and moulded carefully over the model. It is used for mechanical purposes prior to vulcanisation.

Vaseline Oil.—*Syn.* LIQUID VASELINE.

Used as a vehicle for **Hypodermic Injections** For the suspension of insoluble mercurial salts, such as calomel. salicylate, succinimide, benzoate and yellow oxide of mercury, 1, 5, or 10% mixtures being employed.

Oleum Petrolei Flavum is a commercial article of similar consistence.

Huiles Lourdes de Petrole.

Heavy Petroleum Oils—products from American Petroleum Distilling between 280 and 400° C. Sp. Gr. 0·880 to 0·905

Vaselin Oil, 'Vaseline Liquide' FR. CX. is prepared from Caucasian Petroleum by purifying the fractions between 335° and 440° C. Sp. Gr. about 0·875 *i.e.* it approximates *Paraffinum Liquidum* in character. Employed in Huile Grise *q.v.*

Paraffinum Liquidum (*Off.*).—*Syn.* OLEUM PETROLEI, PETROLATUM LIQUIDUM, U.S. CHRISMALINE, ✱Paroleine (T.M. 248370).

Dose.—2 to 4 drachms (**8 to 15 Cc.**).

A clear oily liquid obtained from petroleum after the more volatile portions have been removed by distillation. Sp. Gr. 0·860 to 0·890 (*Off.* For spraying as also for 'Toilet Paraffin' is preferred with gravity 0·865 to 0·870). *For internal use* 0·880 *to* 0·885 *is preferred.* Below 0·880 it is not suitable as an internal lubricant. U.S. has now two varieties,—one termed Heavy, the other Light Liquid Petrolatum—with different viscosities.

A careful clinical comparison of treatment with low (130) viscosity Liquid Paraffin, Sp. Gr. 0·8718 and high (230) of Sp. Gr. 0·8902, showed that the latter had a slightly more laxative action and there was decidedly more tendency to leakage with the low viscosity oil.

The highly viscous oil was more satisfactory in general. A standard of not less than 180 should be adopted.—H. B. Russell and P. C. Brett, L. i./23,594.

Samples examined for ourselves have had viscosities 281 and 290.

(We deal further with the question of viscosity in *Vol. II.*).

Russian Oil contains principally Saturated Hydrocarbons while **American** petroleum contains a large proportion of the unsaturated Olefines. The Baku Oils differ from Pennsylvania and other U.S. Oils in consisting largely of hydrocarbons of the Naphthene group. (Saturated single link *ring* compounds). American oils are best for chlorinating. *cf.* p. 62.

***Russolax** (Design Regtd., T.M. 370353), is distilled and refined in England. It has consistently high viscosity (275 seconds at 100° F.).

Uses.—Liquid and Soft Paraffin have been recently much employed as electuaries or lubricants in constipation. Also of use for colitis in children internally. By its lubricating action there is a probability that, taken regularly, it may avert appendicitis.

Enteric with constipation in Egypt well treated.—L.ii./14,231,421.

It is used as a basis for laryngeal and nasal spray solutions or pigments, containing menthol (1 in 8 or more), cocaine (soluble only 1%) or other medicaments. *Alkaloidal bases and their salts are in general only very slightly soluble in any of these liquid paraffins.* A little Oleic Acid added assists solution.

'PARAFFIN PAIN' from giving Liquid Paraffin as an intestinal lubricant may be due to poor viscosity, but may also be due to the time of giving the oil. The pain corresponds often to the hunger pain described in cases of duodenal ulcer. Give small doses, say 2 dr., and not immediately after food, or one dose of one ounce at bedtime, increasing gradually if necessary.—S. Samuel, Pres., Oct. '20.

Wound dressing. Medicinal paraffin good.—B.M.J. i./22,940.

SCOTTISH SHALE OIL INDUSTRY—Dermatoses of paraffin workers.—Alexander Scott, B.M.J. ii./22,381.

Possible danger in internal use. It is 'officially' recognised as a cause of cancer in workers. Author states that in practically every case of malignant disease of the colon which has come to his notice the patient was in the habit of taking Liquid Paraffin for the relief of constipation. Suggests further investigation.—J. Burnet, Pres., Apl. 23, 138. Editorial comment not inclined to endorse the theory, *ibid.* 137.

Tumours due to Liquid Paraffin injections. Three cases of pseudo-tumour provoked by Liquid Paraffin injected as vehicle for chemicals like Camphor.—M.P.C., Oct. 25/22,343.

Paraffin Oil, used as a vehicle subcutaneously or intravenously, has been shown to be attended with danger of subsequent tumour formation. Results of experiments on monkeys.—F. D. Weidman and Marjorie S. Jefferies, per Jl. Trop. Med., June 1/23,202.

Paraffin dressings found of great value for the relief of pain in herpes zoster; effective only during the eruptive period.—Howard Fox, per Pres., Feb. 23, 83.

Emulsio Petrolei cum Hypophosphitibus. *Martindale.*

Dose.—1 to 4 drachms (4 to 15 Cc.).

Some experiments conducted by us in 1907, with a view to making a satisfactory 50% Emulsion, gave the following as the best of a number tried.—Rub Powdered Gum Acacia (good) 4 ounces with Liquid Paraffin 8 ounces, Soft White Paraffin 2 ounces, Cinnamon Oil 24 minims, Then add in 2 portions a solution of Sodium and

Calcium Hypophosphites of each 192 grains, Saccharin Elixir 90 minims in Water 10 ounces.

Equal parts of Liquid and Soft Paraffin produce a thicker emulsion.

Emulsio Paraffini cum Pancreatino.

Dose.—2 to 4 drachms (8 to 15 Cc.).

Liquor Pancreaticus 2 ounces included in this formula.

For the intestinal stasis of tuberculous children drachm doses of a preparation of this nature promote healthy function of the bowel.—Pr., Jan. 1913, 281.

Emulsio Paraffini et Bismuthi.

Dose.—One ounce (30 Cc.) first thing in the morning and at bedtime, followed by ⅔ tumblerful of moderately hot water.

Liquid Paraffin 1 ounce, Clove Oil 10 minims, Sodium Bicarbonate and Compound Tragacanth Powder of each 1 drachm. Emulsify with Chloroform Water ½ ounce, and Solution of Bismuth 1 drachm and add in portions Chloroform Water to 8 ounces.

The small dose of Bismuth is intentional. In some cases larger quantities may prove constipating.

The formula is varied to suit the case, *e.g.*, Peppermint Oil 10 minims may replace the Clove Oil, varying doses of Bismuth Salicylate, or Subgallate, may replace the Bismuth Solution, and where there is constipation Vinum Aloes or Compound Tincture of Aloes ½ ounce to 1½ ounces may be incorporated.

Catarrh of the alimentary tract is frequently responsible for toxæmia due to insufficient or impeded action of the liver and pancreas. This condition is often the cause of affections of the circulatory system (heart troubles, etc.), coupled with evidence of rheumatoid arthritis and of fibrositis.—W. Bezly Thorne—"Discussion on Alimentary Toxæmia."—P.R.S.M., Vol. VI., No. 7, May, 1913, pp. 261-265.—L. i./13,1384.

Milk Casein as emulsifying agent for Paraffin Emulsions.—P.J. ii./13,208.

The following are flavoured preparations :—

Aperfine Liquid. *Dose.*—2 to 4 drachms (8 to 15 Cc.). Liquid Paraffin flavoured with oil of Lemon.

Aperfine. *Dose.*—2 to 4 drachms (8 to 15 Gm.) is similar but in paste form. It contains 70% of White Soft Paraffin.

These act purely physically, hence produce no evil effect or habit.

The following are some other Paraffin preparations on the market :

***Aperol** (T.M. 290001). **Delectol. Internol. *Petrojel** (T.M. 274384).

Osacol (T.M. 365487) **Jelly** contains 75% Russian Paraffin in a Malt Extract basis.

Fructolax. *Dose.*—2 to 3 drachms at bedtime. A lenitive and laxative containing about 80% soft Hydrocarbon with a fruit conserve. For internal use.—L. i./13,328.

***Laxamel** (T.M 355661). *Dose.*—1 to 4 drachms (4 to 15 Cc.). A jelly containing 80% Paroleine.

***Maltaffin** (T.M. 355917).—A paraffin and malt preparation is described, p. 543.

Emulsio Paraffini cum Rhamno Frangula.

Dose.—½ to 1 ounce (15 to 30 Cc.)

Liquid Extract of Buckthorn Bark 1 ounce, Liquid Paraffin 4 ounces, Benzoic Acid 5 grains, Irish Moss Decoction to 8 ounces. A mild laxative.

***Paraffagar** (T.M. 355918).

A combination of Hydrocarbon Oil with Agar Agar as an antiseptic electuary, which cannot have a weakening effect upon the system.

Dose.—1 to 2 drachms at bedtime. Children, ½ to 1 drachm increased if necessary.

Confectio Petrolei K.C.H. *Syn.* LAXAR.

Dose.—1 to 2 drachms.

Agar Jelly 4%, 1 ounce, White Soft Paraffin 1 ounce, Peppermint Oil 2 minims, Cassia Oil 2 minims, Saccharin ½ grain.

***Semprolin** (T.M. 353942) **Emulsion.**—For use as a lubricant to the alimentary and intestinal tract. Contains 60% Liquid Paraffin. Combinations with Bismuth and Pepsin, Glycerophosphates, Hypophosphites, Iron, Lecithin, Guaiacol, Malt, Salol, etc., are made. Semprolin Cream containing 90% Liquid Paraffin and Semprolin Carminative are also prepared.

Given as a lubricant Liquid Paraffin enters the cæcum mixed with the iliac contents and keeps the contents of the large bowel soft. In addition it accelerates the passage of the fæces through the large intestine which consequently does not become overloaded. The whole of the ingested Paraffin can be recovered from the stools,—there is no toxic action even with large amounts. Sir W. A. Lane was the first to popularise Paraffin for intemal use. —J. W. Peck, P.J. i./14,28,508.

Liquid Paraffin should be *non-fluorescent*. For intestinal stasis Paraffin is an ideal remedy, but Sir W. Arbuthnot Lane cautions against the use of the lighter oil, which is used so extensively for sprays in nose and throat vork.—Am. Jl. Ph., July, 1914,327

For a large number of references to its early use as a lubricant see Edn. XVI.,p. 596.

Liquid Paraffin is a good catheter lubricant.

In a case of recurrent generalised eczema madidans local use of Liquid Paraffin effective.—B.M.J. ii./13,1013.

℗Paraffinum Compositum Liquidum. CAN. FORM.

Mix the following intimately, to make a homogeneous liquid. Camphor 3·4, Menthol 1·0, Thymol 0·5, Eucalyptol 1·0, Oil of Wintergreen 3·4, Hydrastine 0·015, and Liquid Paraffin a sufficiency to make 1,000. Is suitable for use as an antiseptic and astringent 'Nebula.'

Nasal passages and throat should be kept clean with a simple oily preparation, *e.g.*, Liquid Paraffin, as they are frequently the paths of infection, for pneumonia, rheumatic fever, influenza and diphtheria, also for cerebro-spinal fever and poliomyelitis.—Sir James Barr, B.M.J. i./11,1359.

Capsules (Gelatin) with pointed ends of **Sterile Liquid Paraffin** are made for lubricating catheters, &c.; they contain 30 minims.

Wound Dressing with Liquid Paraffin.

At one stage in the war there was considerable enthusiasm for 'Oil' preparations as wound dressings and there is no doubt that a simple dressing of this kind could be used with advantage to many uncomplicated wounds.

Casualty Clearing Station results show success with Liquid Paraffin preparations. Gauze used for packing a wound smeared with a Paraffin Paste should be wrung out of Liquid Paraffin or Iodoform-Paraffin 1%.—Col. H. M. W. Gray, B.M.J. ii./17,509. *See also* Iodine in Paraffin.

Gauze soaked in paraffin—Liquid or Soft Paraffin—useful to wounds.—J. Campbell, L. ii./18,477,495.

CREOSOTED OIL. (Calot's formula). Liquid Paraffin 70 Gm., sterilised by boiling for ½ hour. Allow to cool and add in order (1) Creosote 5 Gm., (2) Guaiacol 1 Gm., (3) Iodoform (sterile) 10 Gm., (4) Ether 30 Gm.

Used as a wound dressing. A somewhat similar formula has been used for injection into tubercular sinuses.

The various **Lubricating** and **Lighting Oils**, *e.g.* **Kerosene**-fractions between 120° and 133° C., and **Mineral Naphtha** (to be distinguished from Solvent Naphtha *q.v.*), are the next fractions, and are mentioned here to render the series more complete.

Laryngeal diphtheria well treated by ordinary petroleum oil (Kerosene)—(taste being covered with compound sarsaparilla decoction) in thirty minim doses on three successive days every four hours reduced subsequently. Breathing became easier. Claimed to have potentialities in other diseases.—T. M. Clayton, B.M.J. i./15,208; P.J. i./15,241.

(NOTE.—During the war and probably since—the benzol, toluol and xylol fractions were removed from mineral naphtha in great measure thus producing a liquid with much higher boiling point.—Abel Scholar C.D.).

Lefroy's Crude Mineral Oil Emulsion. *Syn.* **Petroleum Insecticide.**

Crude Mineral Oil (Kerosene) 110, Soft Soap 50 (whale oil soap is specified) with about 10 of water to form a jelly. For use against lice, fleas, flies, etc.—both destroying them, preventing their further attack and thereby acting as a prophylactic to many forms of infectious disease—typhus, typhoid, diphtheria, diarrhœa, dysentery, consumption, etc. It is used like ordinary soap for washing. If a little be allowed to dry into the clothes vermin will not approach. The same effect is secured by rubbing a little over the skin.—H. Maxwell-Lefroy, L. i./15,1150

✱ **Vermijelli** (T.M. 365780). A preparation originally devised for spraying plants after dilution. The following is similar:—Whale Oil Soap 160, Crude Petroleum 110, Naphthalene 4.—H. M. Lefroy, B.M.J. i./15,317. Preparations of this kind in conjunction with 'N.C.I.' (*q.v.*), have been much used in the war.

Favus cured in less than a month by soaking with the Petroleum of commerce.—B.M.J. i./09,1297.

Petroleum Burning Oil may be rendered smokeless by shaking with seawater containing proportion of vinegar.—Patent.—P.J. ii./10,685.

Huile de Petrole, FR. CX. has Sp. Gr. 0·800 distilling between 130° and 180° C. from American Petroleum. Flash point not below 35°.

'Petrol' *Syn.* GASOLINE, 'MOTOR SPIRIT' and **Petrol Tests**, *see Vol. II.*

For wounds, swabbing out with Petrol gave good results.—M. H. Embree, B.M.J. ii./16,327.

Of great value for cleaning cuts, abrasions, septic wounds and burns; also in the early stages of diphtheria and similar diseases—by swabbing the nasopharynx with lint soaked in petrol it is possible to cut the disease down to a minimum.—G. A. Stephens, Pres., April '23,140.

Petrol Poisoning resembles drunkenness. Treatment: little to be done beyond placing patient in fresh air and keeping him warm.—B.M.J. i./15,769.

Petroleum Benzine or **Benzoline** is the fraction between 60° and 90° C. This is used for cleaning purposes. Distinguished from Benzene (Benzol), the product obtained from Coal Tar, *q.v.*

Petroleum Spirit. *Syn.* PETROLEUM ETHER ***used for heating cauteries.*** Has Sp. Gr. 0·67 to 0·7, and distils over below 60° C. C_5H_{12}=72·121 principally.

Benzinum Purificatum U.S. is Purified Petroleum Benzine with Sp. Gr. 0·638 to 0·660 at 25° C. and B. pt. 40 to 80° C.

Benzine (*preferably spelt Benzin*) *means Petroleum Benzin.*

Petroleinum, P. Belg. and **P. Jap.** have Sp. Gr. 0·64 to 0·67 with B. pt. 50° to 75° C. Fr. Cx. has with *Syn.* **Gazoline**, Sp. Gr. 0·65 to 0·67, and to distil over entirely below 85° C. **Ligroin** is a very similar product.

Petroleum Spirit.—With Sp. Gr. 0·640 contains always a large fraction boiling below 40° C., and with Sp. Gr. 0·700 contains a large amount distilling above 60° C.—Tyrer and Gosling, P.J. ii./12,157.

Pétrole léger. Fr. Cx. has Sp. Gr. about 0·6, and distils entirely below 50° C.

Amyl Hydride. *Syn.* Pentyl Hydride; Pentylene; Hydramyl. Mainly C_5H_{12}=72·121. Obtained by the fractional distillation of Petroleum Spirit. Sp. Gr. 0·625 to 0·649, boiling point about 30° C. It is very inflammable; applied locally, is not absorbed, but rapidly freezes the part by evaporation. **Rhigolene** is similar.

Poisoning by Petroleum Benzine treated with Camphor injections, and oxygen inhalation.—B.M.J. ii./09,5.

Oleogen contains Oleic Acid, Yellow Petroleum Oil, with a proportion of Ammonia. A clear yellow oily preparation. Sp. Gr. 0·91. It is miscible with Chloroform in all proportions.

Medicated Oleogens of the following are prepared:

Camphor, 30% Rubefacient. **Guaiacol,** 20% Antituberculous. **Ichthyol,** 10% Antiseptic. **Iodine,** 5 and 10% Antisyphilitic. In tinnitus aurium should prove of value—a few drops to be rubbed extensively behind the ear night and morning. **Menthol,** 2% Rubefacient. Antineuralgic. **Salicylic,** 10%, Antirheumatic.

Vasogen Compounds containing Creosote 20%, Guaiacol 10%, Ichthyol 10%, Iodine 6 and 10%, Menthol 2%, Salicylic 10%, Sulphur 3% (Vasothion), are made for skin medication.

Mercury Vasogen 33% and 50% in capsules containing 3 Gm. are used for syphilis.

Vasenol. An emulsion of Soft Paraffin and Spermaceti, containing Soft Paraffin 28 ounces, Cetaceum ½ ounce, Water 8 ounces. Forms a useful ointment basis. Mixes with water forming a neutral emulsion. It is readily absorbed.

Lotio Paraffini Composita. Gt. Orm. H.

Soft Paraffin 3 ounces, Balsam of Peru 2 drachms, Mercuric Oleate 60 grains, Olive Oil 1½ ounces. To be applied with a stiff brush. For parasitic skin diseases.

PELLETIERINA.

$C_8H_{15}NO$=141·168.

Dose.—2 to 6 grains (**0·12 to 0·4 Gm.**).

A mixture of alkaloids obtained from pomegranate stem and root bark, *Punica Granatum* (B.P. 1898), ('Granatum' U.S.) (*Lythraceæ*), in minute shining white crystals. The alkaloids are at least four in number, their amount varies between 0·5 and 0·7%. In addition 20% Tannin. Granati Cortex (Root Bark). P. Ital. has *Syn. Melograno.*

Fluidextractum Granati, U.S.

Average dose.—30 minims (2 Cc.). 1=1. A glycero-hydro-alcoholic extractive.

Pelletierine is β-2-piperidyl propaldehyde or in other words the aldehyde of Coniine. Though a secondary base it does not react with Nitrous Acid. The alkaloids of Pomegranate root seem to be entirely racemic though originally believed to be optically active.—Hess & Eichel, Ber., 1917.

Pelletierinæ Sulphas, Punicine Sulphate. (Fr. Cx.).

$(C_8H_{15}NO)_2H_2SO_4$=380·412.

Dose.—2 to 8 grains (**0·12 to 0·5 Gm.**).

A brown syrupy liquid, freely soluble in water, sometimes as crystalline mass. As a remedy for tape-worm : 5 to 8 grains taken fasting, followed by a full dose of compound tincture of jalap ; for 13 years, half the above dose, and for infants one-tenth.

Fr. Cx. provides complete method of manufacture from the pomegranate root bark. In the final stage of extraction the combined pelletierine and isopelletierine are present as sulphates in aqueous solution which on slow evaporation yield a 'crystalline residue' of the two salts. The mixture is called 'Pelletierine Sulphate' for short. The dose is usually **0·3 Gm.** with **0·4 Gm.** of Tannin and **2·5 Gm.** of Syrup. Max. single dose is **0·4 Gm.**

Pelletierinæ Tannas, *Off.*

Dose.—2 to 8 grains (**0·12 to 0·5 Gm.**).

A mixture of the Tannates of the Alkaloids in greyish powder only slightly soluble in water, but soluble about 1 in 80 of alcohol 90%. As a tæniafuge, 8 grains followed in 2 hours by an ounce of castor oil proved an effectual dose, causing neither colic nor headache.

The **Hydrobromide** with same dose is a brownish viscid liquid.

PEPSINUM.

Dose.—5 to 10 grains (**0·3 to 0·6 Gm.**) either with or immediately before or after meals, in a pill or cachet. It is not unpalatable sprinkled on meat like pepper.

The gastric juice of man is believed to contain two distinct digestive ferments :—

a. Pepsin. This changes protein (fibrin, albumen, &c.) into peptones in an acid medium, 0·2% of Hydrochloric Acid being the most advantageous. To this the medicinal pepsins owe their activity

b. Curdling ferment, which curdles the casein of milk ; this is very active in the stomach of the calf, and will permit of its being dried ; it is contained in the preparations of rennet preserved with salt, known as :—

Essence of Rennet. *Syn.* **Liquor Seriparus,** Liquid Rennet.

Dissolve Sodium Chloride 40 in water 810, add Alcohol 190 and macerate Rennet (calf's stomach) 100 in the mixture for three days with frequent agitation, then filter.—N.F., Ph. Form. gives three other formulæ—one with Glycerin and Boric Acid as preservatives.

Rennet can clot 400,000 times its weight of Casein in Milk.—C.D. '19, 543.

Rennin. Rennet Ferment in powder form. One grain dissolved in about ½ ounce of water will in an hour or two curdle a pint of milk under ordinary conditions. (To be kept at blood heat.)

Rennet Tablets are prepared and are of considerable convenience. One will curdle a quart of milk.

Pepsin may be used in cheese-making instead of rennet. It is impossible to detect any difference between cheese made with pepsin and that made with rennet. The pepsin solution is :

Sodium Chloride 2 lbs., Boric Acid 3 ozs., Water 1 gallon.
Dissolve by boiling, then cool to 104° F., and add Pepsin 13½ ozs.—C.D. fi./17,761.

Pepsin is a light yellowish brown or white powder, or in translucent grains or scales, prepared by drying under 100° F. the fresh mucous lining of the stomach of the pig, sheep, or calf. It has a faint, not disagreeable odour, is moderately soluble in water. Rubbed with water, it makes a glairy mixture. Pepsina Porci is generally preferred. Pepsin is supplied to dissolve 2,500 (*Off.*), 3,000 (U.S.), and 5,000 times its weight of freshly coagulated and disintegrated white of egg.

For various other Assay methods see Vol. II.

Incompatibility according to our experiments, depends to a great extent on concentration of the diluent fluid. A *small* quantity of electrolyte seems essential to enzyme action. Salts present *in any quantity* hinder the enzyme. The following if present in strong proportion *prevent action* :—

Alcohol,	Copper Sulphate,	Potassium Salts (Chloride,
Alkalis,	Extract of Malt,	Bromide, Iodide),
Alum,	Magnesium Sulphate,	Sodium Chloride,
	Paraldehyde,	Hexamethylenetetramine.

Further details, see Vol. II.

Asbestos, as also Aluminium Hydroxide, has the power of removing Pepsin and other ferments from solutions. *cf.*, p. 156.

Flavoring.—Syl Lavandulæ, Syl Coriandri, or as Elixir Pepticus

Soluble and Insoluble Pepsins (Commercial).

Insoluble Pepsins are of two kinds, one precipitated by salt, and one made directly from the selected membranes without digestion, but purified by washing in spirit. These require a small quantity of Hydrochloric Acid to effect solution in water.

Soluble Pepsin is made by self-digestion of the membranes and subsequent dialysis of the resulting Peptone, thus leaving the peptic power in a soluble and more isolated form. It is then dried on glass plates, being sold in scale or powder form.

In sprue and hill diarrhœa, Pepsin has given good results.

In vomiting due to utero-gestation, pepsin in dose of 7 to 8 grains has been advocated as of service.—Yeo.

Pepsin and Hydrochloric Acid given immediately after eating will inhibit carbohydrate digestion in the stomach. It should not be taken until from 30. to 45 minutes after eating.—Prof. Diner, Jl. A.M.A., per Pres., Feb. '20.

Glycerinum Pepsini (*Off.*).

Dose.—1 to 2 drachms (**4 to 8 Cc.**) in water.

A solution of Pepsin 8% strength in Acidulated Glycerin and water. This is a very active solution. B.P. '98 differed slightly. If made with good scale Pepsin keeps indefinitely.

Contused wounds if sloughing is suspected should, it is suggested, be treated with glycerin of Pepsin.

Elixir Pepticus. *Dose.*—½ ounce after each meal.

Glycerin of Pepsin 8, Dilute Hydrochloric Acid 1, Aromatic Syrup to 32.

Liquor Pepticus (Benger's).

Dose.—1 to 2 drachms (**4 to 8 Cc.**) in a wineglassful of water with meals. An active solution of the ferments in weak alcohol.

Liquor Pepsini et Caffeinæ. *Martindale.*

Dose.—2 to 4 drachms in water after meals.

The above dose contains 5 to 10 grains of Pepsin with 1 to 2 grains

of Caffeine. As a digestive and restorative. The presence of Caffeine is stated to increase the activity of Pepsin.

℗ **Elixir Pepsini Bismuthi et Strychninæ.**

Dose.—1 drachm (=Pepsin ½ grain, Bismuth and Sodium Tartrate 2 grains, Strychnine $\frac{1}{64}$ grain).

Dissolve Scale Pepsin 64 grains in Glycerin 1 ounce, Water 1 ounce, mixed. Dissolve separately Strychnine 2 grains in Tartaric Acid 2 grains, Water 3 ounces and add Glycerin 1 ounce. Then mix with Glycerole of Bismuth and Sodium Tartrate 2 ounces, and add Aromatic Elixir 8 ounces, and Caramel 4 drops. Finally, pour the Pepsin Solution first prepared into the other liquid.

To prepare the **Glycerole of Bismuth and Sodium Tartrate,** dissolve Bismuth Subnitrate 1,142 grains in Nitric Acid 19 drachms, previously diluted with Water 10 drachms. Then add in parts, Water 16 ounces. Add Tartaric Acid 860 grains, and then gradually Sodium Bicarbonate 977 grains, Dilute the Bismuth Tartrate formed with Water 32 ounces. Allow to deposit, and wash repeatedly until free from Nitric Acid. Mix Sodium Bicarbonate 977 grains with Water 5 ounces, and add cautiously Tartaric Acid 860 grains, warming slightly to dissolve. Dissolve the Bismuth precipitate in this Solution, add Glycerin 8 ounces. Evaporate or dilute with Water if necessary to 16 ounces. Each drachm contains 16 grains of Bismuth and Sodium Tartrate with excess of Sodium Tartrate.—Caspari. Looks better coloured pink.—W.H.M.

Tabellæ Pepsini. *Dose.*—1 or 2 just before or with meals.

These have 3 grains of pepsin in each in combination with chocolate, they are palatable—a handy form of providing the digestive.

Tabellæ Pepsini et Bismuthi. *Dose.*—1 or 2 just before or with meals,—contain 3 grains bismuth oxynitrate added to the above.

Tablets of Pepsin, compressed, 3 grains (0·2 Gm.).

Tabellæ Pepsini et Caffeinæ.

Contain 3 grains Pepsin with 2 grains Caffeine. *Dose.*—1 to 2 after a meal. Digestive and tonic.

℗ **Tabellæ Pepsini et Strychninæ.** *Dose.*—1 or 2 after a meal. Contain Pepsin, 2 grains, with Strychnine Hydrochloride $\frac{1}{100}$ grain.

Vinum Pepsinæ.

Dose.—1 to 2 drachms with meals.

U.C.H. has Pepsin 3, Diluted Hydrochloric Acid 3, Sherry to 60.

NOTE.—For sale without a Wine Licence in the United Kingdom Pepsin Wines must contain 1 *of Hydrochloric Acid* (*B.P.*) *in* 80 *of the total product.*

✱ **Ingluvin** (T.M. 48213.) *Dose.*—5 to 20 grains (**0·3 to 1·2 Gm.**) is a special Pepsin said to be prepared from the gizzard of the fowl; it has been chiefly used to allay the sickness of pregnancy.

✱"ENZYMOL" (T.M. 233020). A proprietary described as an "Extract of the Gastric Gland." Used externally dissolves septic matter, pus and dead tissues, removes offensive odours and acts as a stimulant to the part. Suggested for affections of the aural and nasal cavities and for dissolving coagula in the bladder.

PEPTONE.

A whitish readily soluble powder, prepared from meat (the proteins and albuminoids), peptonised either by acidulation and heat under pressure, or by artificial digestion with pepsin or trypsin, and freed from saline matter. Certain types of peptone have been extensively used in bronchial asthma by immunisation with non-specific protein, *vide infra.*

Peptonised Beef.

A chocolate-coloured paste, having a bitter taste and the odour of extract of beef; prepared by artificially digesting beef by means of acidified fresh gastric juice and concentrating the solution. It is sometimes added to beef tea, but is too unpleasantly bitter to be readily taken by patients. Enemata and suppositories, *v. infra.*

Peptone F.E. is manufactured by digesting 1 kilo of beef with 10 litres of water (containing 4 Gm. of hydrochloric acid per litre) with pepsin 10 Gm. for 8 hours at 50° with frequent shaking. Termination of reaction shown by absence of precipitate with nitric acid on adding to a little of the filtered liquid. Evaporate. 1 kilo yields 250 Gm. approximately.

Peptonised Beef Suppositories.

Contain 30 grains of the Peptonised Beef. The value of this method of feeding has been questioned. *cf.* Enema Nutriens.

Peptonoids of Beef (Gerrard).

Lean Beef, finely minced, 8 ounces, Pancreatin 60 grains, Sodium Bicarbonate 60 grains, Water 1 pint. Digest 3 hours at 130° F. with constant stirring; neutralise with hydrochloric acid, boil, strain and press. As enema 1 ounce with normal saline 3 ounces, *p.r.n.*

The proprietary article, **Carnrick's Liquid Peptonoids**—'Beef, Milk and Wheat' is a predigested food. *Dose.*—½ tablespoonful at intervals. May be dispensed by registered chemists without requiring a spirit licence to be taken out, providing it forms a constituent of a *bona-fide* medical prescription given by a duly qualified medical practitioner. Also applies to **Panopepton.**—P.J. i./11.568.

Beef Peptone with Malt.

Dose.—2 to 4 drachms. A palatable nutrient.

PROTEIN THERAPY.

(Immunisation in Bronchial Asthma and allied affections).

Skin Reactions.

Broadly speaking, the theory in this matter is that one can determine whether an asthmatic is sensitive to an unlimited and diverse collection of vegetable and animal proteins, and his subsequent treatment is by (1) segregating him from the offending protein, or (2) 'desensitising' him with gradually increasing doses of 'non-specific' protein.

We believe we are correct in stating that the pioneer in exploiting these Cutaneous Tests was I. C. Walker.

Out of Walker's 400 cases 191, or 48%, gave a + skin reaction.—I. C. Walker's papers, Arch. Int. Med. Chicago, 1918, XXII., 466; Boston Med. and Surg. Jl., 1918, CLXXIX., 288, Arch. Int. Med. Chicago, 1919, XXIII., 220; Jl. Med. Res., 1920, XLI., 457–466. For an extensive bibliography on the subject *v.* opening paper, "Discussion on Asthma and Allied Disorders," by Sir Humphrey Rolleston.—B.M.J. ii./21,235.

Manufacture of Skin Tests.

Various workers speak of making the Test Solutions by 'Solution in N/10 Sodium Hydrate—*i.e.*, maceration of the protein preparation for a period of time in the alkali. Certain solutions supplied commercially for the purpose, which we have examined, appear to be *without* this alkaline solvent—*i.e.*, they are solutions prepared without anything in the nature of preservative (Cresol or Alcohol) made by simply macerating the protein in water or saline.

Personally, we advise both alkali and 0·5% Trikresol with control of a similar composition. It is clearly necessary to prepare the solutions with extreme care.

It is of convenience to arrange the various Test Solutions in closely related groups, *e.g.* :—

Animal Proteins :—Various meats (beef, mutton, veal, chicken, game), fish, egg and milk.

Furs and Feathers : Horse, dog, cat, sheep, rabbit, chicken, goose, etc.

Cereals :—Wheat, barley, oats, rice.

Fruits :—Various.

Vegetables :—Various (potatoes, cabbage, etc.).

Bacterial :—B. Coli, etc.

Pollens :—These, for use in Great Britain, should be of typical indigenous British grasses and trees. It appears to us unscientific to employ preparations of pollens from plants indigenous abroad. These are unlikely to be the cause of hay fever or kindred affections in this country. (It is stated that grass pollens are similar in effect while the pollen of "flowers" differ—*vide infra.*)

Technique of Protein Skin Test.

Cleanse the skin on the inner side of the forearm with Alcohol or Ether and place a small drop of an alkaline solution of the group protein upon it. With a knife or needle scratch sufficiently to break the skin surface without producing bleeding. Do the same on another place on the forearm, using a drop of control fluid. A + reaction shows in a few seconds by a zone of hyperæmia spreading outwards—followed in 20 to 30 minutes by the production of a definite urticarial wheal, of at least ¼ inch in diameter with little or no effect at the control.

Protein Test Papers.—In use moisten and apply to the skin.—E. A. Cockayne, Clin. Jl. Jan. '24/23,38.

Remarks on Diagnostic value of the test.

Cutaneous Tests to determine sensitiveness to proteins, etc. Hay fever in U.S.A. is attributed to **Ragweed (Ragwort)** and pollens. Causative influences in asthma are also cats, feathers, rabbits, various grain flours.—I. C. Walker, Jl. A.M.A., Sept. 20/782.

Asthma, hay fever, urticaria, angio-neurotic œdema, may be classed in the group of toxic idiopathies.

Hypersensitiveness may possibly be acquired, *e.g.*, by constant contact, as in bakers with flour proteins but it is improbable that the condition arises *de novo* from absorption of foreign protein *via* the subcutaneous tissues or a damaged mucous membrane.

The value of positive skin tests in diagnosis of hypersensitiveness to protein is shown by success of treatment—desensitisation by injection of the offending protein, avoidance of a food protein, or vaccines—based on the information provided. On non-specific lines the treatment is by intramuscular or intravenous peptone.—Sir H. Rolleston, L. ii./21,281 ; B.M.J. ii./21,233.

Skin injection tests in asthma. In the majority of asthmatics the trouble is due to inhalation of dandruff from fur, feather or hair of domestic animals. A useful discussion of the entire subject. —F. Coke, B.M.J. i./21,372 and 615.

In many cases of asthma the patient was found to give reactions to one or more groups. The largest proportion of cases reacting

to these skin tests were found to be sensitive to pollens. In the animal group of proteins feathers appear to be the most prominent. —Mackenzie Wallis, B.M.J. ii./21,796.

Cutaneous sensitisation and focal sepsis in etiology of certain skin affections. Some persons are liable to develop toxic symptoms when exposed to influence of certain food, animal, plant or bacterial proteins, drugs, etc. This tendency is markedly hereditary. Idiosyncrasy towards more than one substance is the rule—possibly not dependent on anaphylaxis.—H. W. Barber, B.M.J. ii./21,554.

Positive skin tests for hypersensitiveness, discussion as to value of. Not more than 50% of all cases give it. 130 test substances used at New York hospital. In asthma cases giving a negative protein cuti-reaction, bacteria play a prominent part. Desensitisation by hypodermic or oral use of the offending protein discussed. In skin tests the grass pollen reactions are much greater than those of food proteins. Any *grass* pollen can be used for the test but the pollen of each kind of flower is different. Some cases of epilepsy give a definite + protein skin test.—J. Freeman, Mackenzie Wallis, Frank Coke (**Histamine** may possibly be concerned in production of asthma), A. E. Gow, and others, B.M.J. ii./21,196.

With a protein to which the patient is very sensitive, the blush from the original injury to the skin does not fade, but gradually spreads and deepens, and begins to irritate and smart. At other times, the wheal is almost absent and a large area of redness is the chief sign of the reaction. This is only of value when the control or other tests give no reaction at all. It may be delayed for 4 or even 7 hours. Analysis of 270 cases showing proportion of sensitiveness to horse, cat, dog, 'other animals,' hen-feathers, food, bacteria, and pollens. When the offending protein is found, alteration of diet is needed. It may be found, *e.g.*, that hard boiled egg can be taken when light boiled would be rank poison, or a process of desensitisation can be initiated.—A. Latham and F. Coke, Pr., Aug. 22/121.

Cutaneous tests with various proteins—wheat, milk, egg, vegetables, etc., also proteins of Staphylococcus albus, aureus and citreus. Especially useful in urticaria and eczema. Desensitisation sometimes possible.—B.M.J.E. i./21,96.

About one-fi th of non-asthmatic subjects are sensitised to one or more of the substances which are generally regarded as liable to give rise to asthma. —Sabatini, B.M.J.E. ii./21,17.

Among diseases other than hay fever, 100 cases showed positive results to some form of protein, but in only 13 of these was the finding of the test to food or animal protein really of use in further treatment; still, it was useful.—Rackemann, Am. Jl. Med. Sci., Jan, 22nd, per B.M.J.E. i./22,33.

Skin reaction helpful. A patient, emaciated and profoundly depressed, highly sensitive to cereals, had same removed from his diet, with the dramatic result of 16 lbs. gain in weight in a month.—W. Langdon Brown, B.M.J. ii./22,758. See also F. Coke, *ibid* 760.

Asthma in childhood.—Of 50 patients, 40 were child asthmatics. Nine were positive to pollens, one to dog, one to cat and one to bacon.—A Dingwall Fordyce, L.i./23,175.

Skin Affections. — Application of cutaneous sensitisation. Results showed that in chronic generalised eczema 38% showed

a positive sensitisation ; in infantile eczema 78% and in urticaria 79%.—M. F. Engman and W. G. Wander, per Jl. Trop. Med., June 1/23,200.

Peptone Immunisation in Bronchial Asthma.

The method of treatment of bronchial asthma by immunisation with small doses of graded Peptone has been employed with success.

To A. G. Auld is due the credit of introducing (in 1917) this method of 'NON-SPECIFIC PROTEIN THERAPY.' Papers have appeared by him with the following references :—B.M.J. i./17,580 ; ii./18,49 ; i./20,567 ; i./21,696, i./22,835 and L. i./23,790.

It seems evident that Peptone may act as a non-specific desensitiser, though it is by no means certain that a protein to which the patient is sensitive always acts specifically and not in the same manner as Peptone.

In this method of procedure it is unnecessary to determine the exact protein that is the antigen.

A satisfactory immunising process is characterised by a slight leucocytosis, particularly *re* the large mononuclears, and by increase in haemoglobin and red cells.—A. G. Auld, B.M.J. i./22,835.

To test a Peptone as to suitability for clinical use.

(*a*) Add an equal volume of saturated aqueous Ammonium Sulphate Solution to a 10% solution of the Peptone and stir with a glass rod. If satisfactory, a sticky precipitate, which adheres to the rod, comes down in abundance.

(*b*) Add to a few Cc. of a solution, in a test tube, two or three drops of strong Nitric Acid. A copious white precipitate is immediately produced, consisting of primary proteoses. On heating, the precipitate entirely dissolves, and re-appears on cooling.

General Indications for the Method.

The treatment has been applied not only to asthma, but also to such of its congeners as hay fever, associated skin affections, angio-neurotic œdema, cyclic vomiting, periodic diarrhœa, and the migraine-epilepsy syndrome ; in short, to such conditions as exhibit an anaphylactic character or sensitisation.

Contra-indications.

Speaking quite generally, although a very large group of cases responds satisfactorily, other cases are to some extent resistant, and it should be noted that in bedridden, chronic cases the condition of the blood may be such as to render the treatment contra-indicated.

Cases resisting treatment :—

Many of those with chronic bronchitis and developed emphysema, and cases presenting any degree of cyanosis, even without bronchitis ; also those in whom, apart from asthmatical paroxysms, a more or less oppressed condition of the respiration is practically never absent. Where there is a family history of asthma from childhood one may get benefit for two or three weeks and then bitter disappointment. In such, a mildly toxic dose has to be given. In difficult cases a mixture of Peptones sometimes succeeds best.—A. G. Auld, B.M.J. i./20,568.

Technique.

According to Auld, two distinct procedures have been evolved: (1) *Intravenous*; (2) *Intramuscular.*

(1) *Intravenous Treatment.*

A 5% solution of Peptone, of a special type, is employed. Extreme care is taken (*a*) to prevent the delicate albumoses being decomposed by exposure to excessive heat; (*b*) to neutralise the solution with Sodium Carbonate; (*c*) to determine by cultivation experiments that the solution is sterile at the time of use. Bacterial contamination may be followed by the *gravest* consequences. It is obvious that no solution would be more likely to form a culture medium for multiplication of bacteria in the event of chance contamination in manufacture.

The writer has prepared a series of ten

Peptone Sterules for Intravenous use, to comply with these requirements, of the following doses:—

First Dose	0·3 Cc.	(5 minims).		Sixth Dose	1·3 Cc.	(20 minims).	
Second ,,	0·5 ,,	(8 ,,	)	Seventh ,,	1·5 ,,	(25 ,,	)
Third ,,	0·7 ,,	(11 ,,	)	Eighth to Tenth ,,	1·5 ,,	(25 ,,	)
Fourth ,,	0·9 ,,	(13½ ,,	)				
Fifth ,,	1·1 ,,	(17½ ,,	)				

Continuation Course (Intravenous) of Peptone Sterules.

In addition to the above, a set of six doses is arranged as follows:—Three doses each of 2 Cc. (30 minims) and 2·5 Cc. (40 minims).

The injection is given *slowly intravenously* in the arm, no after dressing being necessary. The respective doses are administered every fourth or fifth day. The dose must be varied in certain cases.

(2) *Intramuscular Treatment.*

A 7·5% solution of the same type of Peptone is used, prepared with the same precautions.

Peptone Sterules for Intramuscular use are made of 7½% strength in the same range of ten doses (0·3 to 1·5 Cc.) as the latter, as also a

Continuation Course (Intramuscular) of six doses, three of 2 Cc. and three of 2·5 Cc.

Dosage for children.

The injection in the case of children is made into the muscles, using a 7½% solution also, and commencing with 0·3 Cc. (5 minims).

Two main groups of asthmatical cases appear to exist, which show no tendency to pass into each other. One group (which includes, children) responds quickly to treatment; the other is resistant, and is divisible into such as are totally resistant and those in which by careful immunisation, the disease may be largely overcome.

Bronchitis complicating asthma in children is not thebar to treatment which it presents in an adult.—A. G. Auld, B.M .J. i./20,567.

AULD'S METHOD OF MAKING THE INJECTION.—Dissolve the Peptone in Normal Saline at 56° C. Neutralise to Litmus by adding N/1 or N/2 Sodium Hydrate or Carbonate. Place the solution in the water bath at 56° C. for ½ hour. Filter and add 0·5% Phenol. Bottle with rubber caps. Wait three days and then inoculate an agar slope and incubate at 37° C. for 16 hours. If result is negative, it is suitable for use.—A. G. Auld, B.M.J. i./21,696.

Witte's Peptone.

Frequent references are found in the literature to this brand of Peptone made at Rostock in Germany. We have reason to know that it is much more toxic in effect. According to Auld (B.M.J. i./21,696) it contains too much primary proteose in relation to secondary (roughly 1 to 2), whilst in Armour's the proportion is 1 to 7.

Some cases of asthma and hay fever are remarkably sensitive to intravenous injection of Witte's Peptone. Having found intradermal test positive in a case, A. E. Gow (B.M.J. ii./21,237) gave 0·2 Cc. of 2% solution, as a first dose, to a patient who had had asthma for many years. Within a minute he vomited; his eyes became suffused, and in less than five minutes his back was covered with urticaria.

Histamine to extent of 0·00335 Gm. in 100 Gm. was found in Witte's Peptone. This amount may produce marked reaction. Its presence in Peptone is responsible for dyspnœa, flushing, etc., sometimes produced. It is useless in the immunizing process, if not actually harmful. Armour No. 2 Peptone never gives the Histamine effect. It may be safely given to young children. *Witte's* Peptone is best given with a weaker Peptone.

Physiological testing suggested. The dermal (scratch) test may give evidence as to the presence of Histamine in a strong Peptone solution. All individuals give a marked though varied, response to extremely dilute Histamine solutions. Ergamine can be used as control. Preparations giving a large wheal are unsuited. Confirm by intravenous injection of a small dose. —A. G. Auld, B.M.J. i./21,698; i./22,835.

The majority of patients with bronchial asthma gave a positive intraderma l test with Witte's Peptone but not all individuals in whom the test is positive are asthmatic. The stronger the reaction the smaller should be the initial dose for intravenous injection.—A. E. Gow, L. ii./21,281.

For further note on Witte's Peptone see Peptone Sterules 10%, 10 *Cc.*

Sensitisation in asthma. A. Latham and F. Coke provided a useful summary of the phenomenon. It is known that if an animal is injected with a dose of some foreign protein, *e.g.*, white of egg, normal horse serum, etc., and after a sufficient incubation period of 10 days or so a second injection of the same protein be given, profound symptoms will take place, leading even to death of the animal in a few minutes. The reaction is specific. Whatever kind of albumen or foreign protein is used to produce anaphylaxis the resulting symptoms are always the same for the same species. Asthmatics, soon after being exposed to the article, *e.g.*, food, or animal hair, to which they are sensitive, have their eyes running, and asthma develops, with sickness and diarrhœa an hour or so later. Our knowledge of what actually happens between the first sensitising dose and the second, the exciting dose, is a matter of theory. Some are more prone to sensitisation than others. With regard to predisposing factors, tens of thousands of injections of antitoxic horse sera were given during the war, but, for various reasons, these did not induce sensitisation. Theories apart, man can become sensitive, just as animals. At least 40 deaths are recorded from the injection of horse sera in man, chiefly in asthmatics, who we reasonably suppose to have been horse-asthmatics. An

interesting point arises in the effect of a short surfeit of a protein, *e.g.*, strawberries, lobster, etc.—Pr., Aug. 22/121. See also B.M.J. i./21,372.

In epilepsy, 20 cases of *haut mal* type (average age 18 years), the intravenous administration of a Peptone solution caused arrest of the fits in 9 and diminution of their frequency in a further 6. (Bristol Royal Infirmary and Stoke Park Colony for mental defectives.)

The series of graded doses (5%) above mentioned were used. Injections were made into the vein at elbow once a week—initial dose 5 minims (0·3 Cc.). In the succeeding weeks, 7, 10, 15 and 20 minims were given, unless toxic symptoms occurred. No dose greater than 20 minims was injected.—F. H. Edgeworth, B.M.J. ii./20,780. See also A. G. Auld, *ibid* 840.

It is pointed out that our knowledge as to how Peptone 'acts' in disease is very scanty. The matter is, and will be for a long time, purely empirical.—F. H. Edgeworth, *ibid* 871.

An interesting case in which intramuscular injections proved of great benefit. The patient, a man of 35 years, had been suffering from fits for about 15 years. Various treatments were employed. The effects of Hormotone wore off and condition became worse, a fit occurring at least every 48 hours. The first dose of Peptone brought improvement. The full course of injections was given, four days elapsing between each injection, and the treatment terminated with the Continuation Course as described *antea*. The author appeals for a trial in resistive epileptic cases.—G. R. Hull, Pr., Oct. 1922.

Application of Protein tests in diagnosis and treatment of a special group of epileptics.

The proteins (in many cases isolated in crystalline form from various foodstuffs) were grouped as follows :—

(1) Egg : crystalline egg albumin of various types. (2) Meat and fish : from beef, mutton, veal, chicken, game, fish, shell-fish, etc. (3) Milk of various animals. (4) Vegetables : ground nut, vegetables, fruits, nuts, legumes. (5) Cereals, including all the common types. (6) Peptone. (7) Control of N/10 Sodium Hydrate.

The solutions are made freshly as required, in strength 20 mgr. to 10 Cc. of N/10 alkali. The skin surface is gently scratched. The six or seven tests are applied and the control. A positive reaction occurs, obvious almost immediately after the scratching has been completed, since in 15 seconds an area of hyperæmia appears, which spreads to usually the size of half-a-crown. After leaving the protein solutions in contact with the broken skin for 10 minutes, they are washed off and the results noted. In cases where a + reaction has occurred a small but definite wheal appears retaining the hyperæmic area around it. To make certain, apply a clean microscope slide to the place, and note whether the hyperæmic area can be blanched by pressure alone. In true + reactions this does not occur.

In private practice the offending protein or proteins can be removed from the dietary, and if necessary his desensitisation can be conducted by protein vaccines ; in hospital this is not practicable. Peptone *per os*, two grains twice daily, or once a day, is of value. Fits reduced in frequency. Cereal vaccines are being tried.—R. L. Mackenzie Wallis and W. D. Nicol, in collaboration with Sir Maurice Craig.—L. i./23,741.

Peptone Sterules (1 and 2% strength, Intravenous), as an aid in Vaccine treatment.

In *Vaccine Therapy*, as an aid to overcome hypersensitiveness met with, especially in treating the arthritic group of infections, Peptone has been highly spoken of.

A course of 10 injections intravenously is advised as follows :—

On the first day 0·1 Cc. of a 1% solution ; on the second day 0·2 Cc. of 2% solution ; on the third day 0·4 Cc. of 2% ; on the fifth day 0·8 Cc. of 2% ; on the seventh day 1.4 Cc. of 2%, and thereafter, at three or four days intervals, 1·8 Cc., two or three times. Having reached 1·4 Cc., a subcutaneous dose of vaccine can be given at the same time. This may be rather larger than the one the patient was sensitive to before treatment. No reaction, it is stated, will occur.—H. Warren Crowe, B.M.J. i./23,1046.

Peptone Sterules 10% 10 Cc.

P. Nolf of Liége published results of subcutaneous or intramuscular injection of Peptone in treatment of hæmophilia, of purpura and even of paroxysmal hæmoglobinuria, several years ago, and later in typhoid, in 1917. He used it originally to check intestinal hæmorrhage. Streptococcal septicæmia was well treated by him with intravenous injections of usually 10 Cc. of a 10% solution. The Peptone must be good, and sterilised in the autoclave, and the solution injected *slowly*—on no account more than 5 Cc. per minute. An untried specimen must be tried a drop at a time. If nervous on the matter, give the dose in 150 to 200 Cc. of saline. The Peptone appears to have a well marked effect on the white cells and albumins of the blood plasma—the most important constituents of the blood in the battle with infections.—B.M.J. ii./20,328.

Varied forms of chronic non-infectious diseases treated by the **Danysz method**.—subcutaneous injections of heterogeneous bacillary proteins—or by **Nolf's method**—intraveneous injection of Peptone or heterogeneous injection of bacillary proteins. Gow uses *B. Coli* or *B. Typhosus*, 25 mill. to 100 mill. killed bacilli, suspended in 10 Cc. of normal saline, increasing in subsequent doses. Intravenous injection of 10% Peptone is efficacious, but decidedly more exciting to administer.—F. J. Sadler, L. i./22,929.

Puerperal sepsis. Witte's Peptone 10% solution. Dose : 8 to 10 Cc. intravenously, increased by 2 Cc. every other day, until 16, 18 or 20 Cc. is given, causes immediate and rapid fall in blood pressure and rise in pulse frequency. If the latter exceeds 34 per ¼ minute temporarily suspend.—A. E. Gow, B.M.J. ii./20,268.

Peptone per os.

Dose :—0·5 Gm. (7½ grains) thrice daily, half hour before meals.

In view of the presence of Peptone practically constantly in the stomach or alimentary canal, the giving of Peptone *per os* looks

like carrying coals to Newcastle.—A. G. Auld.

Migraine in dyspeptics, benefited by 7½ grains of Peptone *per os*, ¾ hour before the three chief meals.—Pagniez and Nast, L. ii./20,143.

In a special group of epileptics small doses found of value.—R. L. Mackenzie Wallis and W. D. Nicol—*vide* abst. under Epilepsy *antea*.

An assistant of ours (P. H.) suffering from persistent urticaria took 10 grains *t.d.* to which it promptly responded.

Abstracts from literature on the treatment.

Bronchial asthma. A review of recent methods of treatment; (1) Intravenous Peptone, (2) Danysz method of vaccinating with autogenous and heterogeneous cultures of all the intestinal micro-organisms that will grow on a sloped gelatin or Peptone culture, (3) massive intravenous doses of dead typhoid bacilli. '*Hypersensitiveness*' is probably brought about by the passage of the offending substance through the mucous membrane. The majority of us owe our protection to some quality in the mucous membrane in which the asthmatic or member of the allied group is deficient.—A. Latham, L. i./22,261. (*Cf.* abstract under Tuberculosis and Typhoid.)

A case typical of many is recorded of a boy of 14, with parents and antecedents asthmatics. Attacks lasting a few days. Turbinals cauterized 4 years previously without effect. Horse-sensitive—gets violently sick on eating a soft-boiled egg, but tolerates hard-boiled. +Dermal reactions to horse hair and egg. Eleven intravenous injections of peptone caused asthma to cease (after the 5th). Eight months after, he reported himself well, but skin tests remained, though less marked. Ater ten months, again reported well and could eat soft eggs with impunity. Dermal reaction still to egg and to horse hair. No asthma on proximity to horses. Other interesting cases, some under treatment for lengthy period, demonstrate the value of the treatment.—A. G. Auld, L. i./23,790.

Pyrogenic Therapy. ('Protein Shock' of American workers). The view is gaining ground that the high temperature which is ushered in by a rigor more or less severe is the crucial factor. Results were obtained with certain colloidal metals intravenously which were attributed to the protective used. Alfalfa Seed proteose, caseose, lecitho-protein and B. typhosus used as pyrogens with good reactions and results. Elderly feeble patients are not suitable. A full pyrogenic reaction, *viz.*, good rigor, high pyrexia, body pains, profuse sweating and usually sickness and diarrhœa are requisite. Amenable to the treatment are arthritis, neuritis and neuralgia, certain skin affections and subacute or chronic inflammatory exudations.—A. G. Auld, B.M.J. ii./21,822.

Asthma and allied disorders—discussion on, opened by Sir H. Rolleston, B.M.J. ii./21,233; L. ii./21,281.

Scientific basis of Non-specific Protein Therapy. It developed along purely empirical lines from specific treatment from serums and vaccines, but in spite of the specific aspect it was established that in many cases non-specific vaccines and serums were as active as the specific. Intravenous use of proteins and their products was found to be particularly effective. Peptone (intravenously) gives a less violent reaction than vaccines. It appears probable that the common active principle is a product of protein decomposition. The toxic effect of Witte's Peptone is well known, but it is important to note that so-called peptone poisoning is produced by proteoses and albumoses, and that proteins when broken down completely to peptones have very little toxicity. Witte's Peptone produces, on heating with acid or alkaline Alcohol, **Vasodilatin.** 1 Gm. yielded 0·3 Gm. of this, and the minimum lethal dose of the peptone was 4 mgr. per Gm. of mouse, while the minimum lethal dose of Vasodilatin was 0·1 mgr. per Gm. **Histamine** in Witte's Peptone is not more than 3 mgr. per 100 Gm. It is practically non-toxic. With regard to the blood changes effected by the method, there is no doubt that these protein cleavage products have a strong lymphagogue action, and produce increased permeability of the capillaries, especially in the liver and in the skin. A survey of work by various authorities shows that non-specific Pro-

tein Therapy causes a washing out of the tissue fluids into the blood, causing a number of changes in its composition. The evidence at present is insufficient to show which of these changes is really of chief clinical importance.—A. J. Clark, B.M.J. i./23,315.

The writer has had numerous communications from medical men indicating the efficacy of ' Peptone in asthma' *e.g.*, the following (9/3/23 and 19/11/23) :—

" From the first dose the patient improved very markedly—she had been having daily attacks lasting more than an hour each. After one injection the attacks came only on alternate days and were much shorter. After three injections they came only once in three days and now, after eight injections, she told me yesterday that she had had no attack for four clear days."

Subsequently the report was :—

' The woman has, in all, received 25 injections (combined, of course, with measures for cleansing the alimentary canal). The injections have been made at increasingly long intervals, and the result has been most satisfactory. From having daily attacks, she has come down to one attack at long intervals —last time I saw her she had not had one for two months."—V. E. M. B.

Asthma in children. According to Ratner, the hair of rabbit comes second to horse hair as an ætiologic factor in the production of asthma. Rabbit fur is largely used in the manufacture of children's clothes and toys.—(American Jl. Dis. Child, 1922, 24, 346). M.P.C., Jan. 31/23,88.

After a course intravenously, a patient declared himself very considerably better. He stated that he felt better than he had done for two years ; the cough had been greatly relieved. The first four doses of the course gave no improvement, but subsequently the patient had what he called, ' an attack of fever,' coming on 24 hours after the injection.

Before and after Salvarsan injections given intravenously.—Schreiner, B.M.J.E. ii./20,74.

Arthritis deformans treated with peptone intramuscularly, 0·2 Gm. dose weekly.—Goodall, B.M.J. i./23,512.

Adrenalin, which is of acknowledged efficiency in asthma, has been satisfactorily used in conjunction with Peptone.

Peptone *per os.*, 0·5 Gm. three times a day, half an hour before meals, has been successfully administered in certain cases of urticaria. Urticaria divided into numerous groups, *e.g.* (i) Alimentary group, *e.g.*, shell-fish, eggs, etc. (ii.) Drugs, *e.g.*, Arsenic, Morphine and Salicylates. (iii.) Acute infections and specific fevers, *e.g.*, influenza. (iv.) Chronic infections and focal sepsis, *e.g.* rheumatoid arthrits. (v.) Reflex nervous group, *e.g.*, eye-strain, excitement. (vi.) Endocrine dysfunction.—H. G. Hannay, M.P.C., Jan. 31/23, 91.

For further data on the treatment of hay fever with Pollen Extracts see **Hay Fever.**

MILK HYPERSENSITIVENESS. Apart from such general reactions as asthma urticaria and the like, the stomach may be, or become, hypersensitive to various foods, and of all foods milk is the most likely to disagree. Account of three remarkable cases.—T. Gillman Moorhead, M.P.C., Jan. 17/23,46.

In ANTHRAX, intramuscular injection of Peptone 3% in doses of 30 Cc. daily in 43 cases. The results were as good as those obtained when a normal or specific serum was used.—R. F. Vaccarezza and Co-workers, per T.D.B. 19/22,897.

Some commercial Peptone too acid for use bacteriologically. A German variety of Peptone was cited which will almost inhibit the growth of V. Choleræ. Peptone which requires more than 1·4% soda to neutralise is of no value for culture of cholera vibrios.—T. Kabeshima, T.D.B. 20/23,369.

Milk Injection. Sterilised.

Dose.—5 to 10 Cc. intramuscularly but much smaller doses have been used in certain affections.

(The milk in preference should be freed from the bulk of its fat.)

The gonococcus cannot resist a high temperature. It has been observed that if an intercurrent febrile disease arises whilst a patient is suffering from gonorrhœa or an acute epididymitis complicates

the case, the urethral discharge may cease without returning. Schmidt and Saxyl reported in 1916 that protein reactions could be produced by milk injections. Hence these injections which have the power of raising body temperature might have effect on the gonococcus.

The method was tried in acute and subacute stages of gonorrhœa, injections into the gluteal muscles of sterilised milk in 5 Cc. doses, 10 Cc. into each buttock being given. Chill, general malaise and rise in temperature followed; normal in 24 hours. Dangers nil and results good.—M. W. Browdy, L. i./23,874.

Infantile convulsions treated with milk injections. After giving 10 minims into the child's thigh the effect was magical. ? Anaphylaxis the actual cause of the fits, and whether the injection of milk desensitized the infant. Also found successful in diarrhœa.—W. A. Wilson-Smith; B. P. Sabawala, B.M.J. i./23,238.

Interstitial keratitis well treated with combined treatment of Neosalvarsan (intravenously) and milk (intramuscularly).—Van Lint, per Pres., Feb. 23, 73.

Intravenous injections of Yeast or ferments such as Zymase or Trypsin produce inflammation of the uveal tract. Milk injections (intramuscularly) have proved of great value in eye conditions attributable to bacterial proteins circulating in the blood stream.—per Pres., Feb. 23, 72.

PHENOLPHTHALEINUM (*Off.*). U.S., Ph. Ital. IV.

Syn. ✱Purgen (T.M. 243986 and 286636 Assoc.), ✱Laxoin (T.M. 253802), Laxatol, Laxans, Laxen, Phenolax, Dihydroxyphthalophenon.

$$C_6H_4<\begin{matrix}C(C_6H_4\cdot OH)_2\\ CO\text{———}O\end{matrix}>=318{\cdot}212.$$

Dose (*Off.*).—2 to 5 grains (**0·12 to 0·3 Gm.**), but larger doses are used. To be given in preference in fine powder *e.g.* in Slipule (No. 1 for 3 grains) or as effervescent.

A crystalline substance M.pt. 250 to 253° C. made by interaction of Phenol and Phthalic Anhydride. Soluble 1 in 10 of alcohol 90%, but only 1 in 600 of water.

Pharmacology.

Phenolphthalein is dissolved in the bile and alkali in the intestine, and being now slightly irritant to the intestine, causes peristalsis. It is partly absorbed and excreted by the liver, and so acts again and again in the intestine—it acts hence for a few days as a mild aperient.—D. Grieve, P.J. ii./21,490.

Uses.—As a purgative. Ordinarily ½ to 3 grains is sufficient, but patients confined to bed require from 3 to 10 grains. Does not irritate the kidneys. Is satisfactory for prompt action, as in jaundice.

More active than Cascara and less griping. In intestinal toxæmia ideal.—J. C. McWalter, L. ii./15,1141.

Skin eruptions from Phenolphthalein in U.S.A.—Wise and Abramowitz, B.M.J.E. i./22,81. Pres., May 22, 182; July 246.

Capable of destroying red blood corpuscles and inducing toxic degeneration of the kidneys, cases cited.—per Pres., Jan. '23,15.

Many cases of poisoning recorded although dosage was within the maximum limit.—K. Schmilinsky, per Clin. Jl., Jan. 31/23,59.

Purpura following ingestion of Phenolphthalein.—Lauze, B.M.J.E. i./23,81; Clin. Jl. Dec. 19/23,611.

Personally we have never come across any of these bad effects but they are conceivable from excessive use.

Phenolphthalein Tablets, $\frac{1}{2}$, 2, and 4 gr. are made.

Under the name "Purgen," is supplied as "Infants" containing Purgen $\frac{3}{4}$ gr., "Adults' Purgen" $1\frac{1}{2}$ gr., and "Strong Purgen" $7\frac{1}{2}$ gr.

Ⓟ **Tablets Phenolphthalein Compound.**

Phenolphthalein 1 grain, Strychnine Hydrochloride $\frac{1}{250}$ grain, Belladonna Extract (*Off.*), $\frac{1}{100}$ grain. These weigh $2\frac{1}{2}$ grains (0·15 Gm.). A useful combination.

Tabellæ Phenolphthalein with Chocolate Basis are made $\frac{1}{2}$, 2 and 4 grains.

Tabellæ Phenolphthalein (4 grains) **cum Extracto Rhei** (3 grains), form a useful combination.

Phenolax Wafers contain Phenolphthalein 1 grain, Aromatics and Sugar *q.s.*, to 5 grains. They are divisible into halves to facilitate dosage.

Phenolphthalein Valerianate. *Syn.* **Aperitol.** PATENT 27,095/190 lapsed in 1913.

Directs to prepare Phenolphthalein di-isovalerianate by heating phenolphthalein 5 with isovalerylbromide 6 on a water bath until generation of HBr ceases. Dissolve the product in Benzene and shake with Dilute Soda Solution. Evaporate the benzene solution and recrystallise from alcohol.

We would suggest condensing Phenolphthalein with iso-valerianic anhydride in the presence of fused sodium acetate. It would be of interest to heat equimolecular proportions of Phenolphthalein and the valerianic anhydride $(C_5H_9O_2)_2O$ = 218·194 with an excess of Sodium Acetate and extract with alcohol or other suitable solvent.

Dose, children $1\frac{1}{2}$ grains (**0·1 Gm.**) adult 6 grains (**0·4 Gm.**) increased. A mixture of equal parts Valeryl and Acetyl phenolphthalein has been supplied in Tablet form.

Effervescent Phenolphthalein.

Dose.—One to two teaspoonsful in half a tumbler of warm water a good half hour before breakfast. Contains 3 grains per drachm. A satisfactory mild laxative taken first thing in the morning.

Phenol Sulphone-phthaleine (**'Phenol Red'**), employed as a test for permeability of the kidney. *See Vol. II.*

Fluorescein.—Tetraoxyphthalophenon Anhydride.

Resorcin-phthalein Anhydride. $C_{20}H_{12}O_5$ = 332·196.

In yellowish red powder, *sparingly* ***soluble*** in water, more so in presence of an alkali, *e.g.*, Sodium Hydroxide, forming **Sodium Fluorescein** *Syn.* **Uranin**; showing a most intense green fluorescence.

For use as an indicator in acidimetry (suitable for Ammonia). Prepare Solution of the fresh dye 0·4 Gm. in Alcohol 90% 50 Cc. and add Water 30 Cc. Stand the flask on black ground, using 5 to 10 drops.

May be used as proof of death by injection. There is no reaction in case of death but if death is only apparent, the integument and the eyes turn green in a few minutes.—P.J. ii./11,436.

Liquor Fluoresceinæ, R.O.H. Fluorescein 2 and Sodium Bicarbonate 3 in 100. Useful to diagnose corneal lesions. The ulcers and parts denuded of epithelium take a green colour, which persists for 2 or 3 hours. Loss of substance in conjunctiva is denoted by a yellow colouration.—L. i./91,447.

'Sterules' of **Fluorescein** solution are cleanly in use.

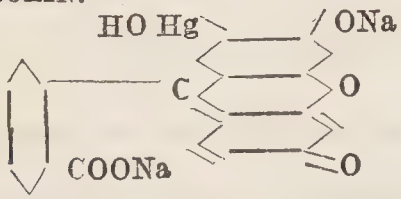
The **Rhodamines** have remarkable tinctorial power—the red dye classed as 'G extra' especially. The colour in a milligram of a solution containing 0·000,000,000,0001 Gm. is discernible.—L. i./13,184.

A representative of the group of Rhodamines is

$$HOOC.C_6H_4.C\begin{cases} C_6H_3N(C_2H_5)_2 \\ C_6H_3{=}N(C_2H_5)_2Cl \end{cases}O$$

which is obtained by heating for several hours at 200° C. one molecule of Phthalic Anhydride with two molecules Diethyl-m-amido-phenol.

Flumerin. *Syn.* DISODIUM SALT OF HYDROXYMERCURIC FLUORESCEIN.



or $C_{20}H_8O_5.Na_2,HgOH = 592{\cdot}78$

Dose.—The dosage for adult males varies from 0·2 to 0·45 Gm in 2% Solution, given at bi-weekly intervals, the average number of injections being 10.

A reddish-brown powder, containing 33% Mercury in the non ionised form.

It is antiseptic and readily soluble in hot or cold water. Freshly prepared solutions should be used.

A new mercurial for the intravenous treatment of syphilis.

As a result of the treatment of 25 cases of syphilis, the following conclusion were drawn: (1) gross secondary lesions show improvement within one wee of administration of Flumerin alone, (2) the action is not lasting, (3) a positiv W.R. is usually not altered to a negative, (4) tertiary cases presenting definit lesions show rapid clinical improvement with Flumerin alone, (5) toxic effect of the nature of acute mercurialism are occasionally seen; conversely, cases great toleration are noted, (6) it should be given an extended trial on accoun of its rapid anti-syphilitic effect. It is clearly indicated that the drug shoul be used along with Salvarsan preparations [*or iodides—vide below*].—W. E Snodgrass, L. i./24,117.

(There is an error in the graphic formula for the compound in this pape The carboxyl group should be in the ortho position to the other side chai as we show it, not meta.—W.H.M.).

Flumerin should be given between courses of Arsenobenzol and not simu taneously. The suggestion to give with iodides is surely an error since there danger of toxic mercuric iodide being formed. Moore and Wasserman sugge Arsenobenzol 8 doses at 5 to 7 day intervals, then 1 week later 12 Flumer injections every other day; this is immediately followed by 6 injections Arsenobenzol and 1 week later by 16 injections of Flumerin. Treatment continued until the usual criteria of cure fulfilled.—Pres., Feb. '24,90. S also T. Stephenson, P.J. i./23,83.

Mercurochrome '220' *Syn.* **Dibromo-oxy-Mercury Fluoresce** (or its Sodium Salt) $C_{20}H_7O_5Br_2HgOHNa_2 = 750{\cdot}604$

Iridescent green scales readily soluble in water.

Incompatible with alkaloids (*e.g. Cocaine*) and with Nov cain, Butyn, Alypin, etc.—not to be used with the latter as vesical wash.

Sterules of Mercurochrome, 2 Cc. are prepared of strength diluted with water to 30 Cc.=1% solution.

As a vesical antiseptic 1% aqueous solution is tolerated by the bladd for 1 to 3 hours and occasions no pain. It is very penetrating and has lo toxicity. Rapid in action in refractory cases of cystitis and pyelitis, al used in gonorrhœa, chancroids and as dressing for buboes. In vitro, 0·1 kills *B. Coli* and *Staphylococcus aureus* in urine in one minute.—Jl. Am. Me Assn., 1919, 1483, abst. P.J. i./20,6. B.M.J.E. i./20,20. See also Pres., Ju 1923,249.

Mercurochrome : Note p. 675, line 1. The 25% solution stated in the American literature is an error for **2·5**% solution.

In gonorrhœa a 25% solution has been tried, as also a 5% ointment in Lanolin. The strong solution may be used every 3 hours and causes temporary irritation—*ibid.* Personally we would advise *caution*.—W. H. M.

Ophthalmia neonatorum treated by 2% solution. Affection disappeared. Non-irritating.—Clapp and Martin, J.A.M.A., May 1/20, Pres., Feb./21,69.

Incompatible with alkaloids and local anæsthetics.—Pres., June '23,249.

Intravenously, in dose of 2 to 5 mgr. per kilo body weight in 1% solution in water, successful in puerperal sepsis and acute gonorrhœa.—Young & Hill, J.A.M.A. Mar. 1/24.

Chloro-Mercury-Fluorescein. A compound from which Phenol-sulphone-phthalein is eliminated in the urine has been given *per os* as urinary disinfectant.—L. i./22,147.

Experimental nephropathy produced by **tetrahydoxymercuri-phenolsulphone-phthalein.**—Burns and co-workers, J.C.S.A. i./20,610.

PHOSPHORUS. (*Off.*), U.S.

P=31·04.

Dose.—$\frac{1}{100}$ to $\frac{1}{20}$ grain (**0·0006 to 0·003 Gm.**). Max. single dose (*Off.*) $\frac{1}{25}$ grain, Fr. Cx. $\frac{1}{64}$ grain. Max. during 24 hours $\frac{1}{32}$ grain.

Phosphorus is obtained by converting Calcium Phosphate (of bones) into the soluble Superphosphate by heating with Sulphuric Acid; this is reduced to metaphosphate by heating with charcoal and finally by further heat is converted into normal Calcium Phosphate with evolution of vaporised Phosphorus.

A poisonous, non-metallic element melting at 110° F., igniting at a slightly greater heat, and forming white fumes of phosphoric anhydride.

German Shells contained Phosphorus, yellow and red.—B.M.J.i./15 259. Capable of producing localised gangrene and anaerobic bacterial infection more barbarous than expanding bullets. We had occasion to examine a shell of this kind ourselves—it contained the red variety.

Antidotes.—Give Copper Sulphate 3 grains every five minutes (see Antidotes to Poisons), or Hydrogen Peroxide ½ drachm in 1 ounce of water, repeated every 15 minutes. Potassium Permanganate 1% solution *per os* is also good chemically, or Magnesium Sulphate ½ ounce. Give demulcents. Previously French Oil of Turpentine was advised but Oils in general are unsuited.

Inject normal saline solution and give alkalis as soon as the vomiting and purging subside.

Necrosis of jaw bone caused by work in Phosphorus Match Works. There are two types known as phosphorisme (anæmia, albuminuria and fragility of bones) and 'Phossy jaw.' Scarlet Phosphorus sets up acute structural changes in the brain. Sesquisulphide of Phosphorus is now used, and is free from danger.—Sir T. Oliver, B.M.J. ii./21,111.

Soluble about 1 in 320 of absolute alcohol, about 1 in 200 of ether, about 1 in 25 of chloroform, about 1 in 100 each of oleic acid, almond, olive, castor, theobroma oil, and suet; in half its weight of carbon bisulphide, almost insoluble in water; combines chemically with oils of turpentine and peppermint, forming non-luminous and comparatively non-poisonous liquids.

Uses.—Phosphorus has been given as a nervine stimulant in various affections of the central nervous system and in neuralgia; and in leucocythæmia, and some skin diseases.

There is no evidence that the central nervous system is ever in a condition of phosphorus starvation. The evidence that phosphorus retention is increased by giving organic and inorganically combined phosphorus is conflicting.—B.M J. ii./10,1598.

N.B.—Preparations should be recently made and kept from light.

Elixir Phosphori.

Add Compound Tincture of Phosphorus 1, to Glycerin 4.

Dose.—15 to 60 minims (**1 to 4 Cc.**) in water. Contains $\frac{1}{50}$ grain in one drachm. A palatable well tolerated 'fluid' form of Phosphorus.

Oleum Phosphoratum (*Off.*).

Dose.—1 to 5 minims (**0·06 to 0·3 Cc.**), on sugar or in perles.

Contains about 1% (by weight) of Phosphorus in prepared almond oil. (*Off.* now flavoured with Lemon Oil.)

Flavoring.—Emulsified and Glyl Rosæ added, taste is covered but more usually given in **Perles** or **Pills.**

ORIENTAL SORE well treated by Phosphorated Oil 5 minims, injected into the nodules and subcutaneously twice a week. Technique described.—A. Castellani, per Jl. Trop. Med., June 1/23,194.

Perles of Phosphorus. Contain $\frac{1}{100}$, $\frac{1}{65}$, and $\frac{1}{32}$ grain.

Phosphorated Cod Liver Oil Capsules. *Dose.*—1 to 4.

Prepared by diluting Phosphorated Oil, B.P. 1898, with Cod Liver Oil. Contain one-half drachm, each equivalent to $\frac{1}{100}$ grain.

Rickets well treated by Phosphorated Cod Liver Oil.—E. Pritchard, B.M.J. ii./19,627.

Pilula Phosphori (*Martindale*).

Dose.—1 to 3 grains (**0·06 to 0·2 Gm.**).

Phosphorus 1 and Oil of Theobroma *q.s.* to 100.

Heat the oil to 150° C. and sustain the heat for 5 minutes. Strain and weigh 99 into a wide-necked bottle with an india-rubber cork and when cooled to 65° C. add the Phosphorus, cork and shake well till the fat begins to solidify. In rolling it into pills, divide into suitable lots, and beat each in a mortar to render it plastic before applying it to the machine, then work off quickly and cover with sandarach solution. The mass contains 1% of Phosphorus in perfect solution. A few drops of chloroform added during manipulation checks oxidation. When phosphorus is to be combined with other ingredients in a pill, the following is best used :—

Sevum Phosphoratum, 10%. (*Martindale*).

Phosphorus 1, Pure Carbon Bisulphide 5. Dissolve and add Prepared Mutton Suet 9. (**Sevum Præparatum***, is the purified internal fat of the sheep, M. pt. 45 to 50° C., prepared by melting and straining.—*Off.*).

Add a little of the suet at first, mix quickly, add the remainder, mix thoroughly and allow the bisulphide to evaporate. May be used to make the following pills. They are perfectly stable as there is no interaction or decomposition.

Pilula Phosphori ($\frac{1}{50}$ grain) **cum Ferro** (3 grains).

Phosphorated Suet 10 grains, Reduced Iron 150 grains, Compound Tragacanth Powder 10 grains, Chloroform 15 minims. Mix, and add quickly, Mucilage of Acacia *q.s.*

Divide into 50 pills (or into 750 pills if the quantities be taken in grammes). Cover with Sandarach Solution. They are also made with

Ⓟ **Nux Vomica** ($\frac{1}{3}$ grain).

*Sevum Benzoatum is the same digested with 3% Benzoin at 60° C.

Pilula Phosphori ($\frac{1}{50}$ grain) **cum Quinina** (1 grain).

Phosphorated Suet 10 grains, Quinine (base) 38 grains (=50 grains Sulphate), Chloroform 20 minims. Mix quickly, and add Compound Tragacanth Powder 10 grains, Mucilage of Acacia *q.s.*. Mix, and divide into 50 pills (or into 750 pills if the quantities be taken in grammes). These pills are also made with **Reduced Iron** 3 grains, and with **Reduced Iron** (3 grains) and ℙ1 **Strychnine** ($\frac{1}{40}$ grain).

ℙ1 **Pilula Phosphori** ($\frac{1}{50}$ grain) **cum Strychnina** ($\frac{1}{40}$ grain). Prepare as Pilula Phosphori cum Quinina, with Strychnine $1\frac{1}{4}$ grains *vice* Quinine 37 grains. These are also made with **Reduced Iron** (3 grains).

Dose.—Any of the above pills are best taken directly after meals.

Tinctura Phosphori Composita. *Adopted by B.P.C. Dose.*—3 to 12 drops on sugar.

Phosphorus 1, Chloroform 85. Warm gently in a stoppered bottle till dissolved, and add the solution to Absolute Alcohol to 500. Shake well and keep in the dark. Contains 1 in 500. Becomes acid on keeping.

Phosphorus Pentachloride. $PCl_5 = 208{\cdot}34$. ***Manufacture.***—Pass chlorine *q.s.* into a cooled solution of phosphorus 1 in carbon disulphide 4 until a portion removed no longer gives phosphorescent residue when evaporated on paper. Then remove the carbon disulphide by filtration with aid of reduced pressure, *e.g.* water pump. A yellowish white crystalline mass fuming in moist air, employed chemically in numerous reactions, for example substitution of hydroxyl groups with chlorine.

Zinci Phosphidum, $Zn_3P_2=258{\cdot}19$.

Dose.—$\frac{1}{20}$ to $\frac{1}{3}$ grain (**0·003 to 0·02 Gm.**) in **Pill.** Fr. Cx.—Max. single dose $\frac{1}{8}$ grain; Max. during 24 hours $\frac{1}{4}$ grain approx.

A grey crystalline powder. With acids yields phosphoretted hydrogen.

Phosphorus Determination in Vermin Killers.—Y.B.P. 1919, 124.

Acidum Hypophosphorosum, U.S. $H_3PO_2=66{\cdot}064$.

Dose.—2 to 5 minims (**0·12 to 0·3 Cc.**).

A colourless liquid, strength 30%.

On heating, water evaporates and the acid decomposes at 130° to 140° C., forming hydrogen phosphide, which ignites, and phosphorous acid. The latter decomposes at 160° to 170° C. into hydrogen phosphide and phosphoric acid finally the last portions of unoxidised phosphorus burn out at a higher temperature (U.S.).

Hypophosphites. There is no reliable evidence that they exert a physiological effect or influence any pathological process.—Jl. Am. Med. Assn., per P.J. i./16,247.

Acidum Hypophosphorosum Dilutum, U.S.

Average dose.—8 minims. 10% strength. Sp. Gr. 1·042 at 25° C.

Uses.—Its Salts are mostly employed. It may be added to Syrup of Ferrous Iodide to preserve same.

Method for the determination of a Hypophosphite.—P.J. i./12,12.

Ammonii Hypophosphis. $NH_4.H_2PO_2=83{\cdot}096$.

Dose.—1 to 6 grains (**0·06 to 0·4 Gm.**).

In white deliquescent tabular crystals, soluble 5 in 6 of water. Insoluble in alcohol. It has a nauseous saline taste. ***Incompatible*** like the Calcium Salt. Nervine tonic.

Calcii Hypophosphis. $Ca(H_2PO_2)_2$=170·182.

Dose.—3 to 10 grains (**0·2 to 0·6 Gm.**).

White crystalline salt, with nauseous taste, soluble 1 in 7 of water. Prepared by heating phosphorus with milk of lime until phosphoretted hydrogen ceases to be given off, then filter and evaporate to crystallise or precipitate with alcohol.

Incompatible with oxidising agents, and with Potassium Iodide.

Uses.—Nervine tonic and aphrodisiac. Checks night sweats of 'phthisis, and is used in acne. In epilepsy has proved serviceable.

Mistura Calcii Hypophosphitis.

Calcium Hypophosphite 5 grains, Saccharated Lime Solution 1 drachm, Peppermint Water to 1 ounce.

Barii Hypophosphis.

$Ba(H_2PO_2)_2$=267·482.

Dose.—$\frac{1}{4}$ to 1 grain (**0·016 to 0·06 Gm.**).

White crystalline salt soluble in water $3\frac{1}{2}$. Prepared in manner analogous to the above and its properties are similar.

Ferri Hypophosphis. $Fe(H_2PO_2)_3$=251·008.

Syn. FERRIC HYPOPHOSPHITE

Dose.—1 to 5 grains (**0·06 to 0·3 Gm.**) in a pill.

In commerce is a whitish amorphous powder with a chalybeate taste slightly soluble in water, but more so in presence of Potassium Citrate.

Liquor Ferri Hypophosphitis Fortis, B.P.C.

Dose.—10 to 30 minims (**0·6 to 2 Cc.**).

Dilute 23 of Solution of Ammonia with equal volume of Distilled Water, gradually add Solution of Ferric Sulphate 14·2 previously diluted with an equal volume of water; wash the precipitate by decantation with Distilled Water until free from Sulphates, collect on calico, drain and transfer to a porcelain dish. Add Citric Acid 7·6 and Water 20, heat on a water-bath, with occasional stirring until clear, and then add Sodium Hypophosphite 9·6, and continue heating with stirring about one minute, or till a clear greenish solution results. Add Sodium Citrate 6·6, filter, and pass sufficient Chloroform Water (1 in 200) through the filter to make volume up to 100.—P.J. i./07,102

℗ **Pilula Ferri Hypophosphitis cum Strychnina.** Strychnine $\frac{1}{30}$ grain, Ferrous Hypophosphite 2 grains. To make one pill (or in grammes to make 15). *Dose.*—1 twice or thrice daily.

Magnesii Hypophosphis—$Mg(H_2PO_2)_2 . 6H_2O$ = 262·528.

Dose.—3 to 10 grains (**0·2 to 0·6 Gm.**). White crystalline salt soluble in water, about 1 in $4\frac{1}{2}$.

Potassii Hypophosphis, KH_2PO_2=104·156.

Dose.—1 to 6 grains (**0·06 to 0·4 Gm.**).

A deliquescent granular white powder, having a nauseous, bitter taste. Soluble 1 in 1 of water. Incompatible as the Calcium Salt.

Flavoring.—Syl Aurantii Floris; Glyl Rosæ, Elixir Simplex.

Sodii Hypophosphis (*Off.*). NaH_2PO_2=88·056 ($+H_2O$,U.S.).

Dose.—3 to 10 grains (**0·2 to 0·6 Gm.**). Average U.S. 15 grains (**1 Gm.**).

A white granular deliquescent salt, with a bitter, nauseous taste. Soluble 1 in 0·63 of water.—P.J. i./02,552; and freely soluble in alcohol. With an equal quantity of Sodium Nitrate is explosive. See also Calcium Salt.

Uses.—In phthisis, and as nutrient in wasting diseases generally.

Flavoring.—Syl Sassafras, Syl Lavandulæ, Syl Amygdalæ Amaræ; Syrupus Aromaticus.

℗**Syrupus Hypophosphitum Compositus, U.S. VIII.**

Average dose—2 drachms (8 Cc.).

Ferric 2·25, and Manganese Hypophosphite 2·25, with Sodium Citrate 3·75 are first dissolved in Water 30, then Calcium 35, Potassium 17·5, and Sodium Hypophosphites 17·5 are dissolved in water 400, with Diluted Hypophosphorous Acid 5. Quinine (base) 1·1 and Strychnine (base) 0·115, with Hypophosphorus Acid 10 are then dissolved in water 30. Finally, Sugar 775 is dissolved in the mixed solutions and made up to 1,000 with water. Chloroform 1 in 500 added we find improves its keeping qualities. It contains approximately $\frac{1}{120}$ grain of Strychnine Hypophosphite in a drachm.

In phthisis and like cases, hypophosphites raise the nervous power and improve condition of the secretions. Given in sufficiently large doses for at least 6 months, good result.—Pr. Jan, '13,127.

℗**Tablets of Compound Hypophosphites** each weighing 2 and 4 grains and equivalent to ½ and 1 drachm of the above are prepared.

℗ ✱**Fellows' Compound Syrup of Hypophosphites** (T.M. 20267 and others) is stated to contain in 100 Gm., Potassium, Manganese and Calcium Hypophosphites each 1·2 Gm., Iron Hypophosphite 1·4 Gm., Quinine Hypophosphite 1·0 Gm., Strychnine Hypophosphite 0·02 Gm.

Dose.—Medium Adult, 1 drachm, Children in proportion.

℗ An American syrup sold as **Hematic Hypophosphites** is similar (contains strychnine hypophosphite ⅛ grain in 1 ounce.)

Great care must be taken to distinguish the above preparation which contains strychnine from the following, which contains none:—

Syrupus Hypophosphitum, U.S. has Hypophosphite of Calcium 45, of Potassium 15, of Sodium 15 with diluted Hypophosphorous Acid 2, Sugar 600, Glycerin 50, Water *q.s.* to 1,000. *Average dose.*—2 drachms.

Churchill's Syrup of Hypophosphites.—A proprietary article. Contains no strychnine, *cf.* also Churchill's Inhalant.

℗**Pulvis Hypophosphitum Compositus.** *Dose.*—1 to 4 grains (0·06 to 0·25 Gm.).

Calcium Hypophosphite 37½, Sodium Hypophosphite 20, Manganese Hypophosphite 2½, Quinine Hypophosphite 1½, Strychnine Hydrochloride Trituration *q.v.* 1⅓, Iron Hypophosphite 2½, Milk Sugar to 100. Five grains = $\frac{1}{150}$ grain Strychnine Hydrochloride, approx. *i.e.* 1 drachm of the U.S. VIII. Syrup.

℗**Glycerol Hypophosphitum, Glycerol of Hypophosphites.**

Dose.—1 drachm (4 Cc.).

Dissolve Calcium Hypophosphite 160 grains, Manganese Hypophosphite 80 grains, Potassium Hypophosphite 160 grains, Quinine Hypophosphite 80 grains, Strychnine Hypophosphite 2½ grains in Distilled Water 3 ounces, and add Strong Solution of Ferric Hypophosphite (B.P.C.) 4 ounces, Hypophosphorus Acid 2 drachms, Glycerin to produce 20 ounces. Each drachm contains Strychnine Hypophosphite $\frac{1}{64}$ grain, and Quinine Hypophosphite ½ grain.—P.J. i./06,385.

Wheat-Phosphates, Saccharated the soluble part of bran—the organic phosphates and cerealin (ferment of bran) combined with milk sugar—

are specially useful in weakly and rickety children, and where digestion is impaired, seem to aid the assimilation of food and even of such medicines as iron.

Dose.—Half a teaspoonful (increased) 2 or 3 times a day, may be taken as sugar with food

***Phytine.** (T.M. 267573). A vegetable preparation (calcium and magnesium phosphates with oxymethylene diphosphoric acid also described as 'inosito—hexaphosphoric acid'), containing about 22·8% organic phosphorus. A nervine tonic and brain food.

Phytin Tablets 4 grains (0·25 Gm.). *Dose.*—1 tablet four times a day.

Phytin Granules. *Dose.*—2 drachms per day with meals. Children: 2 to 6 years ½ to 1 drachm per day; 6 to 10 years 1 to 2 drachms.

Quinine Phytin contains 57% Quinine.

***Fosfoxyl** (T.M. 440293). *Dose.*—2 drachms during the day if patient is in an excitable condition or 1 to 2 ounces during the day if there is marked depression.

A combination of phosphorus and the constituents of turpentine, given in melancholia and neurasthenia.

PHYSOSTIGMATIS SEMINA.

Calabar Bean (B.P. 1898). **U.S.** *Syn.* ORDEAL BEANS, from West Africa.

Dose, in powder.—1 to 4 grains. U.S. *average dose* 1½ grains.

History of introduction of the drug.—Gordon Sharp, P.J. i./16,619.

The poisonous properties of the ripe seed of *Physostigma venenosum* (*Leguminosæ*) are chiefly due to Physostigmine, which is contained in the cotyledons only, the content being about 0·25%.

Details of other constituents: last Edn., p. 640.

U.S. requires 0·15% Ether-soluble alkaloids.

Antidotes.—Emetics, Atropine or Belladonna, Chloral, Strychnine, Tannin. Potassium Permanganate 10 grains in 1 pint of tepid water, by stomach tube, repeated in ½ hour. Stimulants freely.—Murrell.

Uses of Physostigma.—Preparations of Physostigma and solutions of its alkaloid Physostigmine ¼ to 1%, applied topically to the eye, contract the pupil, and are antagonistic to atropine.

As a myotic the solution acts in 5 to 15 minutes and the pupils remain contracted for 12 hours. It is employed to overcome the over-dilatation caused by Atropine, Homatropine and Cocaine.—G. Sharp, P.J. i./16,619.

Traumatic tetanus has been well treated with extract ⅛ grain every hour then ½ grain every 2 hours; or give Physostigmine hypodermically, and increase every hour, so as to paralyse, little short of arresting, the breathing. For chorea also it is given in smaller doses. In paralysis it arrests muscular wasting and improves muscular power. In hemiplegia or paraplegia, give doses of $\frac{1}{30}$ to $\frac{1}{10}$ grain of extract frequently.—R.

℗**Extractum Physostigmatis** (B.P. 1898).

Dose.—¼ to 1 grain (**0·016 to 0·06 Gm.**).

An alcoholic extract containing three-fourths of its weight of milk sugar. Yield about 2 to 5%.

Alkaloidal content varies very considerably. U.S. IX. (in powder form) standardises to contain 1·7 to 2·3% physostigma alkaloids.

℗**Tinctura Physostigmatis** B.P.C.

Dose.—5 to 15 minims (**0·3 to 1 Cc.**)

Calabar Bean, in No. 40 powder, 1. Alcohol 90% *q.s.* to 5. (U.S. IX. has 1 in 10 of Alcohol 94·9% vol. and standardises to 0·015% alkaloids.).

It is antagonistic to strychnine, but is *not* to be depended on as a remedy for poisoning by nux vomica or strychnine.

℞ **Physostigmina.** *Syn.* ESERINE.

$C_{15}H_{21}N_3O_2 = 275{\cdot}267.$

Dose.—$\frac{1}{100}$ to $\frac{1}{50}$ grain (**0·0006 to 0·0013 Gm.**).

In colourless crystals, slightly soluble in water, freely in ether, soluble 1 in 180 of vaseline. Solution in castor oil, $\frac{1}{2}$ to 1% (by weight), keeps well for ophthalmic use.

Ⓟ **Unguentum Physostigminæ, R.O.H.**

Physostigmine 0·25, Soft Paraffin 100; heat to dissolve.

℞ **Physostigminæ Salicylas,** U.S., P. AUSTR, FR. CX., P.G.V.

$C_{15}H_{21}N_3O_2.C_6H_4.(OH)\ COOH = 413{\cdot}35.$

Dose.—$\frac{1}{60}$ to $\frac{1}{20}$ grain (**0·001 to 0·003 Gm.**).

In needle-shaped or columnar crystals. Soluble 1 in 140 of cold water; much used as a myotic in solution. Not so liable to turn pink as that of the sulphate. In glaucoma suited for prolonged use.

Ⓟ **Tablets, Hypodermic** $\frac{1}{50}$ grain.

To open the bowels in acute abdominal conditions $\frac{1}{100}$ grain hypodermically until 6 doses have been given (four hourly). This dose is safe—higher dose may act too severely and necessitate bismuth and opium to check the resulting diarrhœa. If no action give a turpentine enema the following day. The muscular coat of the intestine is directly stimulated by Eserine.

℞ **Physostigminæ Sulphas.** P.G.

$(C_{15}H_{21}N_3O_2)_2\ H_2SO_4 = 648{\cdot}61.$

Dose.—$\frac{1}{60}$ to $\frac{1}{20}$ grain (**0·001 to 0·003 Gm.**). (*Off.* $\frac{1}{64}$ to $\frac{1}{32}$ grain).

In yellowish granular crystals, deliquescent and soluble about 4 in 1 of water. Solution becomes pink, but does not lose much in efficacy.

In doses of $\frac{1}{100}$ grain (**0·0006 Gm.**) of value in tympanites as occurring in typhoid fever.

Ⓟ **Guttæ Physostigminæ** R.O.H. 0·062, 0·125, 0·25, 0·5 or 1%. **St. Th. H.** 0·5, or 1%. St. M.'s H. 0·5%.

℞ ℞ **Guttæ Physostigminæ cum Cocaina, R.O.H.**

Physostigmine Sulphate 0·25, and Cocaine Hydrochloride 1, Water to 100. ℞ St. M.'s H. 0·25 and 1·25 respectively in 100.

Ⓟ **Guttæ Physostigminæ et Quininæ.** Liverp'l Eye and Ear Inf.

Physostigmine Sulphate 1 grain, Quinine Sulphate (Bisulphate) 4 grains, Distilled Water 1 ounce.—B.M.J. i./04,452.

Ⓟ **Injectio Physostigminæ Sulphatis Hypodermica.** 1%. *Dose.*—1 to 4 minims (**0·06 to 0·24 Cc.**).

Ⓟ **Lamellæ Physostigminæ (Sulphatis).** (*Off.*). R.O.H.

Each contains $\frac{1}{1000}$ grain (**0·000065 Gm.**); also prepared containing $\frac{1}{250}$ grain and $\frac{1}{500}$ grain respectively, for ophthalmic use. Also ℞ ℞ $\frac{1}{100}$ grain, combined with Cocaine $\frac{1}{20}$ grain.

Ⓟ '**Sterules**' of Physostigmine Sulphate Solution 4 grains to the ounce are prepared, also ℞ ℞ '**Sterules**' of Physostigmine Sulphate, 1 grain with Cocaine Hydrochloride 4 grains to the ounce.

Ⓟ **Unguentum Hydrargyri Oxidi Flavi cum Physostigmina.**

Physostigmine 0·25, Soft Paraffin or Lanoline (anhydrous) 100; heat till dissolved, and add, when cold, Yellow Mercuric Oxide 1.

For corneal ulcers in scrofula, solution of 2 grains to an ounce may be dropped into the eye; also in mydriasis and glaucoma.

Diagnosis of glaucoma, a lecture on—Lieut.-Col. R. H. Elliott, B.M.J. i./20,279.

Eserine occasionally produces toxic symptoms.—H. Herbert, per Pres., Sept. 20, 310.

Ⓟ **Mistura Eserinæ Composita L.H.**

Dose.—½ ounce (**15 Cc.**).

Eserine Sulphate $\frac{1}{15}$ grain, Tincture of Nux Vomica 10 minims, Compound Infusion of Gentian to ½ ounce.

Ⓟ **Tablets of Eserine with Trunecek's Serum** (*q.v.*).

No. I. contain 0·00025 Gm. Eserine in each, with the salts of 50 Cc. of Trunecek's Serum.

No. II. contain in addition to the constituents of No. I. atropine 0·00005 Gm. each, for use in the severest forms of intestinal inaction and in obese diabetic patients. Both forms of Tablets weigh 8 grains (0·5 Gm.) each.

Eserine is given in this way, with or without atropine, for diabetes, on the supposition that the disease is due to arteriosclerosis of the pancreas.

Maximum dose of either—6 tablets per diem.

Eserine ¼ grain given *intravenously* by mistake caused great flow of saliva and incontinence of urine and fæces. Atropine and Strychnine and Oxygen given. Temporary blindness and deafness. Ultimate recovery.—B. L. Slater, B.M.J. ii./22,1120.

PILULÆ.

For pills intended to be varnished, use equal parts of powdered gum acacia and tragacanth with syrup *q.s.* Glycerin as an excipient, if used at all, is best mixed with alcohol. It is unsuited for hygroscopic drugs, such as soft extracts, squills, aloes, &c. For these mucilage of acacia or syrup is preferred, and tragacanth in moderation is very useful as a 'hardener.' For insoluble metallic salts, glycerin of tragacanth (*q.v.*) may be employed, adding, if necessary, a small quantity of powdered acacia or althæa to give firmness.

For **Aloes** Pills Compound Decoction of Aloes is sometimes used.

For **Camphor** a little Tragacanth or Soap and Castor Oil; if with Quinine, Tragacanth and Glucose Syrup, *q.s.*

Unguentum Kaolini (*q.v.*) works satisfactorily for oxidising agents such as **potassium permanganate.** For **Oils**, soap is best used.

In the official Pill masses **Syrup of Glucose** is employed; this is prepared by heating Glucose 1, with Syrup 2, *v. also* **Glucantha.**

Codeine and other Pills given in diabetes should not be massed with Syrup of Glucose.

Pill Varnish (*Martindale*). Sandarach* 1, in Absolute Alcohol 1.

In **Coating** Pills with **Gelatin** the pills are held on needles or by suction in a frame and dipped in a solution of 1 part of gelatin in 4 parts of water.

In **Pearl-Coating**, the Pills are first covered with a mucilage of tragacanth 4 grains to 1 ounce with half a drachm of syrup added; they are then coated by rotating in a pot with French chalk.

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* Resin from *Callitris quadrivalvis* (*Coniferæ*). *Alcohol Sandarachi*, R.D.H. For dental use. Sandarach 2, Alcohol (90%) 1.

The **Sugar-coating** of Pills is effected by placing them in a hemispherical metallic pan kept warm, while making eccentric revolutions, and are alternately moistened with syrup, and dusted with finely-powdered sugar, till dry and uniformly covered.

Methods of Coating Tablets, Pills, Capsules, &c., to render them insoluble in the Gastric Juice but soluble in the Intestines.

Various substances have been suggested for coating pills, tablets and capsules to render them insoluble in the stomach but soluble in the intestines, *i.e.*, on reaching the duodenum. Drugs, for example, which irritate the mucous membrane and the administration of which is liable to induce vomiting, and substances intended to act solely on the intestines and the anthelmintic drugs, have been so given. *Keratin*, as usually employed, seldom brings about the desired effect.

Keratin* is an ammoniacal solution of horn shavings. The commercial solution must be concentrated for use. In using Keratin the pills must not contain moisture or vegetable powders. As a pill basis employ Kaolin with Suet, coat 3 to 5 times with the Solution and finally roll in non-absorbent powder. A coating of wax prior to the Keratin coating is sometimes employed.

Benzonaphthol Varnish.—Benzonaphthol 6, Tannigen 10, Salol 20, Alcohol 90% 30, Ether 100, has also been recommended, but we obtained no better result with it.

Salol applied *melted* is more efficacious. 1½ to 3 grains of Salol applied in this way is suitable for a 3 to 5 grain pill. *cf.* Bismuth Compound Pills, p. 248.

✱ **Stearettes** (T.M. 322854) (Martindale) are made with a coating containing **Stearic Acid** *inter alia*. Stearic Acid alone is useless, —it cracks on drying.

Aceto-Salicylic Acid 2 to 5 grains.
Aloes 2 to 4 grains.
Antipyrin 1 to 5 grains.
Areca 2 to 5 grains.
Calcium Sulphide ½ and 1 grain.
Carbolic Acid ½ to 1 grain.
Emetine-Bismuth Iodide 1, 2 and 3 grains.
Ipecacuanha ¼ to 2 grains.
Magnesium Peroxide 3 grains.
Menthol ½ to 1 grain.
Methylene Blue ½ to 1 grain.
Naphthol Bismuth 2 to 5 grains.
Ox Bile 5 grains.
Pancreatin 1 to 2 grains.
Phenol Bismuth 2 to 5 grains.
Potassium Iodide 5 grains.
Quinine Aceto-Salicylate ½ to 2 grains.
Quinine Salicylate ½ to 2 grains.
Quinine Sulphate ½ to 3 grains.
Reduced Iron 1 to 3 grains.
Sodium Salicylate 2 to 5 grains.
Thymol ½ to 1 grain.
Trilactine.

Stearettes should as far as possible be given immediately after a meal—*i.e.*, when the stomach is *acid*.

Pills.—The 'Stearette' coating is also applicable to pills but with greater difficulty. Tablets are easier to operate upon.

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* **Keratinum.**—*Dose.*—8 grains (0·5 Gm.). It was found that Keratin, in combining with the gelatinous constituent 'glutine' of connective tissue forms in the body a nutritive substance. Administered for syphilitic chronic myelitis and for tabes dorsalis, and has, perhaps, the power of checking the proliferation of connective tissue, and thus to be capable of combating locomotor ataxy.—F.N., 1908.149. It is official as CHERATINA in Ph. Ital. IV.

✱ **Humagsolan** (T.M. 406645/429166) Tablets. This preparation is based on the supposition that, given an increased supply to the hair papillæ of the proximate organic material out of which is manufactured keratin—the organic basis of certain epidermic appendages—it might be possible to influence favourably the growth of wool and hair.—L. ii./20,1285.

Trial on a long-standing case of alopecia seemed to substantiate claims.—L.i./23,658.

Formagules (Formalised Gelatin Capsules).

Where the digestive functions are normal, these should pass the stomach intact and break up in the intestines.

The following **Formagules** are suggested :—

Aloes 2 to 4 grains.
Asafœtida 5 grains.
Copaiba 5 to 10 minims.
Creosote ½ to 2 minims.
Eucalyptol ½ to 1 minim.
Guaiacol Carbonate 1 to 4 grains.
Ichthyol 1 to 5 grains.
Iodinol 10 minims.
Iodoform 1 and 3 grains (as test). —See p. 498.
Male Fern Extract 10 minims.
Methyl Salicylate ½ to 1 minim.
Ox Bile 5 to 10 minims.
Quassia Extract 2 grains.
Salol 2 to 10 grains.
Santal Oil 5 to 10 minims and Compounds.
Santalol 5 minims.

Formagules should be employed for substances which irritate gastric mucous membrane, neutralise acidity of stomach, or are to act on intestinal membrane but not in the stomach, *e.g.*, to destroy worms.

Sahli's Glutoid Capsules are made on these lines. *Vide* also **Membroids.**

A revised list of pills in general request is contained in the Index.

***Pulverette (T.M. 293309) Powder Pills (Patent)** are of special manufacture. These have a thin coating easily crushed.

Cachets of wafer paper are useful for enclosing nauseous medicines and drugs that do not yield all their activity to any solvent, and those whose suspension in fluids is difficult or inaccurate owing to non-diffusibility or decomposition.

Capsules, Soft Gelatin, are useful for dispensing nauseating drugs, particularly oils, *vide* Index.

***Slipules** (T.M. 419586).

This Registered Trade Mark, the property of one of the joint authors, is now applied to the hard gelatin capsule of the 'slip-over' variety, available in commerce.

Under the relative monographs, in numerous instances, the *number* of the slipule which may be used for a given dose of the medicament is shown.

			Content in Sodium Bicarbonate.
No. 5 Slipule (closed)	has length 11 mm.	and diam. 4 mm.	3 grains.
,, 4 ,, ,,	,, ,, 15 ,,	,, ,, 5 ,,	4 ,,
,, 3 ,, ,,	,, ,, 17 ,,	,, ,, 5 ,,	5 ,,
,, 2 ,, ,,	,, ,, 18 ,,	,, ,, 6 ,,	6 ,,
,, 1 ,, ,,	,, ,, 20 ,,	,, ,, 6 ,,	8 ,,
,, 0 ,, ,,	,, ,, 22 ,,	,, ,, 7 ,,	10 ,,
,, 00 ,, ,,	,, ,, 24 ,,	,, ,, 8 ,,	15 ,,
,, 000 ,, ,,	,, ,, 26 ,,	,, ,, 10 ,,	25 ,,

The use of the word will be a convenience to differentiate from the soft variety of Gelatin Capsule and make for uniformity in dispensing.

The author takes the pleasure of presenting the name Slipule to medical men and pharmacists *for the purposes of prescribing and dispensing.* In all other respects its use is reserved by the owner. All Trade Marks (indicated by *) in other portions of the book must be strictly observed.

Collapsable tubes of medicines for internal use in a semi-solid basis suggested as preferable to tablets, etc., the dose to be arranged in a given length of jet, *e.g.*, 1 inch.—F. W. Tunnicliffe, L. i./15,274.

PINUS.

Pinus Sylvestris. *Syn.* SCOTCH FIR OR PINE.

From the wood of this tree (principally in America, France and Russia) much of the oleo-resin, common turpentine, oil of turpentine, Gum Thus or American frankinsence, resin or colophony and tar (*vide* Pix Liquida) are produced. From its leaves also are prepared an extract, volatile oil and wool.

Oleum Terebinthinæ (Rectificatum). *Off.* (*Syn* CAMPHINE), is distilled from the Oleo-Resin Turpentine obtained from *Pinus Sylvestris* and other species of *Pinus*. Sp. Gr. 0·860 to 0·870. Almost entirely distils between 156° and 180° C. without appreciable residue. O.R. varies from different countries.

Oleum Terebinthinæ Æthereum, FR. CX., is distilled from *P. Pinaster* in France. Sp. Gr. 0·864 at 15° C.

See Vol. II. for further data.

Capsules of Oil of Turpentine, 5 and 10 minims each. *Dose.*—1 or more.

Uses.—In INTERNAL HÆMORRHAGE 10 minim doses often successful. In enteric has been given as capsule or emulsion with Spirit of Chloroform—10 minims every two or three hours. Anthelmintic (3 to 4 drachms or more) generally given with Castor Oil. Also given to remove fæcal masses (with Castor Oil) and to remove bile concretions.

Large dose, 2 drachms to ½ ounce and more said to be non-irritant, as also 5 to 10 minim doses, but moderate doses 30 to 60 minims to be used with caution. Large doses act on bowel only, and are little absorbed into the circulation. Hæmostatic in hæmorrhagia purpura. For children of 10 to 12 as much as ½ ounce given with equal quantity of Castor Oil.—B.M.J. i./09,1218.

Loss of sight in a child of ten after measles treated by (*inter alia*) 2 drachm doses of Turpentine Oil with an equal quantity of Castor Oil every night at bed-time. Great benefit to sight and general health in a month. The turpentine must be in sufficiently large dose to have aperient action, as the smaller doses act on the kidneys. Should the desired aperient effect not be obtained with this dose, it may be increased as far as half-an-ounce of each oil. This treatment is of good service in obstinate inflammatory or semi-inflammatory conditions of the eye.—B.M.J. i./11,82; P.J. i./11,96

Hæmostatic action of Turpentine when brought into immediate contact with the surface. Arrested hæmorrhage in a "bleeder" under operation. Use as a compress by soaking lint in it and squeezing nearly dry. Support by a pad of wood wool and fix with a firm bandage. Also successful in secondary hæmorrhage in war wounds. Value when taken by the mouth doubtful.—G. G. Turner, L. ii./15,226. See also *ibid* p. 416. Gauze lightly wrung out in it used to pack sloughing wounds, the change is remarkable. Avoid excess and none of the oil should lie outside the wound or the skin will blister.—C. A. Moore, B.M.J. ii./16,744.

In cases of URETHRITIS of a chronic kind, urethral chancroid and specific urethritis, local applications of Turpentine to the urethra by means of a catheter have given very satisfactory results.—L. i./11,982.

In ENTERIC FEVER a preliminary thorough cleansing of the bowel by small divided doses of Calomel followed by Castor Oil prepares the ground for an enema of 1 ounce with Olive Oil 1 pint given slowly. Next day or day after repeated. In most instances the amount of Turpentine may then be reduced to ½ ounce in Olive Oil 15 ounces, this is administered on alternate days throughout the whole course of the disease and continued until convalescence is established.—B.M.J. i./10,195.

For TAPE WORM 1 ounce doses with castor oil. No injurious effect on the kidneys.

Oakum soaked in it was used in the Peninsula War.—C. Foy, B.M.J. i./15,580.

'Turpentine Punch.' Ten drops of turpentine on a lump of sugar added to a wine-glass of ordinary whisky punch for septic pneumonia.—Sir J. Moore, Pr., Jan. '19, per Pres.

Sterules of Rectified Turpentine 15% in Olive Oil, 1 and 2 Cc. for intramuscular use.

Skin affections treated by Turpentine injections. Mostly those in which an infective agent is known to be the cause, or in which, as in pityriasis rosea or pemphigus, some form of micro-organism may be the causative factor. A 20% solution in Olive Oil was found too painful to continue and was replaced by a 15% solution with 0·5% each of Anæsthesin and Quinine Hydrochloride. *Dose* was 0·5 to 1 Cc. every 4 to 7 days for adults, 1 to 2 minims weekly for infants up to 5, and 4 minims for older children. In some cases no benefit, *e.g.*, in erythema, urticaria or purpura. The best results were obtained in pyogenic conditions of the skin, associated with poor general tone, *e.g.*, in ecthyma, furunculosis, sycosis vulgaris, lupoid sycosis, abscesses and erysipelas. In severe cases of varicose ulcer the lesions became cleaner and rapid formation of granulations and epidermal tissue followed. The general effect is thought to be increased local cell metabolism.—L. ii./22,1287.

Turpentine Injections (10% to 20% in Olive Oil) at Mount Sinai Hospital. The site selected was the intersection of an horizontal line drawn from the posterior axillary border and a line one or two finger's breadth below the brim of the pelvis. At this part the needle easily strikes the periosteum, upon which the injection is made. Good in some cases of acne, especially good in ulcer of the leg.—Med. Rec., Jan. 14,1922; Pr., Aug. 22/188.

Intramuscular injections of 0·5 to 1 Cc. of the 15% solution gave good results in many skin diseases, especially in pyogenic infections where there is follicular involvement, in which cases use 'X' Rays as well.—Jl. Trop. Med., June 1/23, 197.

Emulsum Olei Terebinthinæ, U.S.

Average dose.—1 drachm (**4 Cc.**).

Emulsify Turpentine Oil 15, Almond Oil 5, Acacia 15, with water 30, add Syrup 25 in portions, and finally water to 100.

Another form:—Turpentine Oil and Quillaia Tincture, of each 20 minims water to 1 ounce.—B.M.J. i./06,318,480.

Enema Olei Terebinthinæ, St. M.'s H.

Turpentine Oil ½ ounce, Starch Mucilage to 10 ounces. L.H. has Turpentine ½ to 4 drachms, Soft Soap 1 ounce, Warm Water to 1 pint. The Oil is mixed with ½ of the Simple Enema. This is given and followed by the other half of Simple Enema.

For flatulent distension of the colon of great value. On diagnosis of appendicitis if considerable flatus, an enema of Turpentine Oil is of value. Some give a dose of Calomel, but the peristalsis set up may be harmful.

Stokes' Liniment, N F. *Syn.* LINIMENTUM ALBUM.

Mix one entire egg with Rose Water 85 Cc. Strain and add Turpentine Oil 100 Cc., then Acetic Acid 20 Cc. Shake thoroughly to emulsify and finally add Lemon Oil 4 Cc.

Linimentum Terebinthinæ (*Off.*, and B.P. 1898).

Contains Turpentine Oil 65%. U.S. has Resin Cerate, melted on water bath, 65. Oil of Turpentine 35.

Knight's method is satisfactory.—Mix Solution of Potash (B.P. '98) 3 ounces with water 3 ounces in a bottle, add Oleic Acid 7 drachms previously mixed with Oil of Turpentine 3 ounces, and mix gently. To this emulsion add Turpentine 10 ounces with Camphor 1 ounce dissolved in it, in portions of 1 ounce or more at a time.

Linimentum Terebinthinæ Aceticum. *Syn.* **St. John Long's Liniment.** Emulsify Turpentine 3 ounces, Rose Water 2½ ounces, Acetic Acid 5 drachms, Oil of Lemons 1 drachm with yolk of one egg. A useful counter-irritant. *Distinguish from* Lin. Tereb. Acet. *Off.*

Gossypium cum Oleo Terebinthinæ. *Syn* **Turpentine Wool R.D.H.** Cotton wool or gauze soaked in the oil and squeezed dry, packed into the tooth socket as a stupe.

Spiritus 'Antiparalyticus.'—Turpentine Oil 4, Oil of Amber 4, Camphorated Spirit 64, Solution of Ammonia 28. Used as a liniment.

Sapo Olei Terebinthinæ.
Turpentine 1, Soft Soap 2, Glycerin 1. As a vermicide—also a stimulant local application.

✱**"Sanitas" Fluid,** (T.M. 64575), the solution resulting from the action of water upon air-oxidised turpentine, containing as its active principles hydrogen peroxide, thymol, a soluble camphor, and some camphoric acid. A household disinfectant and oxidiser. Non-poisonous, does not stain linen. Is used in midwifery. **"Sanitas" Oil** has Sp. Gr. 0·95. A strong oxidising agent. For inhalation in phthisis. Diluted with spirit used as spray in a room, or 1 in 8 to 20 of olive oil for skin affections.
(Other T.M.s are 33175, 34778, 48108 and 444095.)

✱**"Sanitas Bactox"** (T.M. 279528). A disinfectant of the coal tar order for medical use, ✱**"Sanitas-Okol"** (T.M. 194594, Class 2) disinfectant. When diluted is non-poisonous. Does not contain Carbolic Acid.
For general use dilute 1 to 500 or 1,000. For cuts and wounds 1 in 300, skin affections 1 in 150. ✱**"Sanitas-Sypol"** is described as a British Lysol.

Extractum Pini Sylvestris. Fir-Wool Extract.
A thick brown liquid, soluble in water and with pine odour; 2 to 4 ounces are added to a 30-gallon warm bath for rheumatism.

Oleum Pini, Oil of Pine. *Dose.*—½ to 3 minims (**0·03 to 2 Cc.**).
The oil of the leaf of *Pinus Pumilio* (*Coniferæ*) was official in the B.P. 1898. It is sold under the fancy names of ✱Pinol (T.M. 88383) and ✱Pumiline (T.M. 88468), and is used for inhalations.
The oil distilled from the fresh leaves of *Pinus siberica* is now *Off.* as **Oleum Abietis.** Sp. Gr. 0·900 to 0·920. It should contain 30 to 40% of esters (calculated as bornyl acetate, $C_{10}H_{17}.C_2H_3O_2$), as determined by saponification with alcoholic potash. The aroma of this oil is entirely distinct from that of *P. pumilio* and *P. Sylvestris.*

Syrupus Pini Pumilionis—*Martindale.*
Dose.—1 drachm (**4 Cc.**).
Contains Pine Oil 1 in 60 in a dilute Glycerin and Syrup Solution.

Ⓟ**Linctus Pini, Terpin et Heroin.**—*Syn.* Elixir or Syrup of Pine, Terpine and Heroin.—*Martindale.*
Dose—1 drachm (**4 Cc.**). Resembles the foregoing with addition of $\frac{1}{48}$ grain Heroin Hydrochloride and ¼ grain of Terpine Hydrate per drachm. Both are useful soothing antispasmodic preparations.

Elixir Pini et Terpin Hydratis (Simplex).
Dose.—1 drachm (**4 Cc.**) diluted.
Similar to the last mentioned, but without Heroin and containing a minimum of Alcohol, for children's use.

Ⓟ **Pinheroin.**
Dose.—1 drachm every 2 or 3 hours, if necessary.
Contains Heroin Hydrochloride $\frac{1}{60}$ grain, Terpine Hydrate 1 grain with Essence of Canadian Pine. A special preparation as a respiratory stimulant.

Ⓟ**Glycogelatin Pastils** (*q.v.*) are prepared containing each ½ minim of Pumilio Pine Oil with ⅛ Terpene Hydrate, and $\frac{1}{48}$ grain Heroin Hydrochloride.

Artificial Venice Turpentine.—Mix Resin 17, Linseed Oil (boiled) 12, Oil of Turpentine 8, or dissolve Resin in Oil of Turpentine; is mostly employed in the Arts. The true article exudes from the branches of the larch, *Larix Europæa* (*Coniferæ*). Common turpentine and artificial products consisting of colophony, resin oil and oil of turpentine, are often employed.—Allen, Vol IV., 4th Edn., 1911,77.
Larch bark is an astringent (owing to Tannin content) and diuretic

Alcoolat de Fioraventi. *Syn.* BALSAMUM FIORAVENTI, FR. CX.
Venice Turpentine (Térébenthine de Mélèze) 10, Elemi 2, Storax 2, Galbanum 2, Myrrh 2, Laurel Berries (Baies de Laurier) 2, Aloes 1, Galangal 1, Ginger 1, Zedoary 1, Ceylon Cinnamon (Canelle de Ceylan) 1, Cloves (Girofles) 1, Raisins (Muscades) 1, Origanum Dictamnus flowers (Dictame de Crète) 1, Alcohol (80%) 60. Macerate 2 days *s.a.* and distil to obtain 50. It is used as an embrocation in rheumatism.

For alopecia, Liquor Ammoniæ 1, Baume Fioraventi 15, Spirit of Camphor 15. Apply with friction after washing with black soap.—B.M.J.E. ii./09,24.

Balsamum Locatelli.—Venice Turpentine 18, Yellow Wax 12, Olive Oil 18 Balsam Peru 2, Dragon's Blood 1. For chilblains (even if broken).—Ph. Notes.

Dutch Drops, Haarlem Drops.—For lumbago and rheumatism.

Ph. Form says:—Form now generally adopted in Denmark and Holland is:—Heat to 165° C in an iron vessel, large enough to allow some frothing Linseed Oil 4 and Sulphur 1, with stirring, until mixture drops off the stirrer with a glassy appearance. Remove from the fire and add 15 parts (by weight) of Oil of Turpentine, and agitate until solution is complete or nearly so, then filter. The liquid should be limpid and of a brownish-red colour.

PIPERAZIN. FR. CX.

DIETHYLENE-DIAMINE. $HN<\begin{matrix}CH_2.CH_2\\CH_2.CH_2\end{matrix}>NH = 86{\cdot}116$.

(PIPERAZINE HYDRATE with $6H_2O$ is in addition official in FR. CX. Supp. 1920. It contains 44·33% Anhydrous Piperazin).

T.M.: The word Piperazine by itself is not registered. A firm registered 166600/1892, a device embodying the word but disclaiming exclusive use of the word. PATENTS: All expired.

Dose.—4 to 10 grains (**0·25 to 0·6 Gm.**), or 15 grains daily.

Manufactured by the action of sodium glycol on ethylene-diamine hydrochloride; colourless alkaline deliquescent crystals of saline taste, soluble about 4 in 7 of water. Melts at 104° to 107° C., B. pt. 145° C.

The following process has been given, but we have not tried it practically:—
A mixture of Ethylene Bromide, Aniline and Anhydrous Sodium Carbonate is heated to gentle boiling for 5 to 6 hours, the warm fused mass extracted with hot water and the crude Diphenyl Piperazine transformed into the Nitroso-derivative by suspending it in cold strong Hydrochloric Acid and gradually adding saturated solution of Sodium Nitrite through a tube reaching to the bottom of the acid. Add the precipitate to a 40% solution of Sodium Acid Sulphite and warm to about 80° C. Make strongly alkaline with Caustic Soda and concentrate by distillation. Distil the residue with superheated steam and collect in Hydrochloric Acid.—Pratt & Young, Jl. Am. Chem. Soc., 1918, 40, 1428, Y.B.P. 1919, 152.

Flavoring.—Glyl Sassafras, Glyl Caryophylli; Syrupus Aurantii.

Uses.—Given internally for the uric acid diathesis, in gout and rheumatism, and urinary calculi. Said to prevent change from glycogen into sugar in diabetes.

It used to be taught that owing to impaired power of excreting Uric Acid by the kidneys, the observed accummulation occurs in the blood and that in consequence Sodium Biurate was deposited in tissues, *e.g.*, cartilages, giving the exciting cause of a paroxysm of gout. Of recent years the opinion has steadily tended back to closely resemble the original, but it is unfortunately *useless to administer a base and expect it to reach any spot in the body in sufficient quantity to have a chance against the Sodium which is so abundant in the blood and tissues.*—Sir A. E. Garrod.

Incompatible with alkaloidal salts, iron salts, quinine, sodium salicylate, spirit of nitrous ether.

Effervescent Piperazin contains 5 grains in a drachm. *Dose.*—1 drachm (**4 Gm.**). Also made with **Phenocoll.** 5 grains

per drachm. **Tablets** and **'Vescettes'** of **Piperazin**, 5 grains (**0·3 Gm.**) to be crushed and taken in a draught of warm water.

Glycero-Piperaz.—*Syn.* PIPERAZIN GLYCEROPHOSPHATE, BASIC. $(C_4H_{10}N_2)_2C_3H_5(OH)_2PO_4H_2 = 344·359$.

Dose.—5 to 10 grains (**0·3 to 0·6 Gm.**).

A granular white salt very soluble in water, neutral to Litmus and containing 50% Piperazin. Our work has shown that this salt is the most easy of the kind to prepare and the most stable. It does not deliquesce as do the neutral and acid salts.

Benzo-Piperaz. PIPERAZIN BENZOATE—$C_4H_{10}N_2(C_7H_6O_2)_2 = 330·282$ and **Salicyl-Piperaz.** PIPERAZIN SALICYLATE—*Dose* 2 to 5 grains —$C_4H_{10}N_2(C_7H_6O_3)_2 = 362·282$ are crystalline salts also suggested for therapeutic use.

Sidonal, New. *Dose.*—30 grains (**2·0 Gm.**).

TRADE MARK 229305/1900 removed from the Register 1914.

Said to be the anhydride of Quinic Acid. White crystalline powder, soluble about 1 in 2 of water, and about 1 in 11 of alcohol 90%. For gout. **Tablets** contain 7½ grains.

The original Sidonal was Piperazin Quinate. Details of the Patent (No. 11420/1899, which became void), in last Edn., p. 650.

Piperidinæ Tartras. *Syn.* PIPERIDINE ACID TARTRATE.

$$CH_2 \begin{matrix} CH_2.CH_2 \\ CH_2.CH_2 \end{matrix} > NH \left\{ \begin{matrix} CHOH.COOH \\ CHOH.COOH \end{matrix} \right\} = 235·189.$$

The tartrate of the base piperidine made by reducing pyridine in alcoholic solution, with sodium amalgam or from Piperine by distillation with Soda Lime or by boiling with Alcoholic Potash.

Dose.—15 grains (**1 Gm.**) three times a day. Colourless pleasant-tasting crystals, readily soluble in water. Uric acid solvent.

Effervescent Piperidine Tartrate.

Dose.—1 drachm or more; 5 grains in 1 drachm.

Piperidine para-Sulphamine Benzoate.

$SO_2NH_2C_6H_4COOH.C_5H_{11}N = 286·28$.

Under the name of ✱CALCUSOL (T.M. 246900) a combination of this salt with potassium bicarbonate is supplied in effervescent form, 5 grains in 60 grains, for the uric acid diathesis and renal calculus. **Tablets** of this combined salt and potassium bicarbonate are to be taken after or during meals in ½ tumbler of water.

PIX LIQUIDA.

Tar (*Off.*, and B.P. 1898). Known in commerce as Stockholm Tar, obtained by the distillation of the wood of various species of *Pinus* (*Coniferæ*). *Further details in Vol. II.*

Dose.—2 to 10 grains (**0·12 to 0·6 Gm.**) in a pill with lycopodium, or in perles (2½ grains each).

As a diuretic and in bronchial catarrh and for coughs, it is very useful, and has been given for gastro-intestinal catarrh. ***Soluble*** about 1 in 1 of alcohol 90%. On account of their antiseptic properties both Wood and Coal Tar and preparations of them have been used for surgical dressings. The former yields Creosote, *q.v.*

Aqua Picis. **Tar Water.**—*Syn.* AQUA PICEA, EAU DE GOUDRON.

Tar 1, Sand 3. Mix and add distilled Water 200. Macerate with shaking for 24 hours, filter. *Dose.*—5 to 10 ounces (**150 to 300 Cc.**).

Tar Water. The apothecary, who, on demand, said he sold nothing else! —B.M.J. ii./23,332.

Pix Burgundica. *Burgundy Pitch* (a misnomer as it comes from Normandy) the exudate from *Picea excelsa* (*Coniferæ*), was employed in making **Emplastrum Picis** (B.P. 1898).

Oleum Picis Rectificatum, Light Oil of Tar.

Dose.—1 to 5 minims (**0·06 to 0·3 Cc.**).

A distilled oil of Wood Tar, known also as Rectified Spirit of Tar with Sp. Gr. about 0·9, sherry-coloured or reddish: antiseptic.

Pilula Picis Liquidæ.

Dose.—1 to 5 minims (**0·06 to 0·3 Gm**).

Tar 1, Soap 1, Compound Tragacanth Powder $\frac{1}{4}$, Licorice Powder $2\frac{3}{4}$. Useful for coughs and for hæmorrhoids—best freshly made.

Syrupus Picis Liquidæ, Syrup of Tar, U.S. (1900).

South American *Syn.* JARABE BREA.

Dose.—1 to 2 drachms (**4 to 8 Cc.**).

Tar 5, wash with water 100; treat residue with the Alcohol 50, add Magnesium Carbonate 10, and Sugar 50, triturate and add Water 400; stir 2 hours and filter. Dissolve sugar 800 in the filtrate by gentle heat and make up to 1,000 with Water.—B.P.C is similar. Taste may be covered with equal quantity of syrup of wild cherry *q.v.*; Ⓟ $\frac{1}{33}$ to $\frac{1}{10}$ grain of apomorphine hydrochloride may also be added to each dose. Useful in chronic bronchitis and winter cough.

Ⓟ**Syrupus Picis cum Codeina. P. Helv.**

Codeine 1, Sugar 505, Tar Water 324, Glycerin 150, Dilute Alcohol 20. *Dose.*—$\frac{1}{2}$ to 2 drachms (**2 to 8 Cc.**).

Unguentum Picis Liquidæ. **Tar Ointment** (*Off.*).

Contains 70% of Tar in a basis of Beeswax and Lard. U.S. has Tar 50, Yellow Wax 15, Lard 35. Useful in psoriasis and chronic dry eczema.

Oleum Cadinum. **U.S., P. Helv.** Fr. Cx. Supp. 1920.—*Syn.* **Juniper Tar Oil. Oleum Juniperi Pyro-ligneum. Huile de Cade.**

By distillation of wood of *Juniperus Oxycedrus* (*Off.*) and some other species (*Coniferæ* or *Pinaceæ*). This oil varies enormously.

For Characters, Tests, and Results of some Experiments see Vol. II.

In most cases of psoriasis a seborrhœa of the scalp will be found. This is well treated with Soap and Water followed by a Salicylic Lotion, Oil of Cade 1 in 5 of Olive Oil and gradually increasing strength till the pure Oil is used.

A good deal is distilled in Spain. Extreme limits of Sp. Gr. observed during twenty years—0·955 to 1·064. Methods of making. Contains, if genuine, (from J. Oxycedrus) high proportion of Cadinene and does not give reaction for pine tar.—C. T. Bennett, P.J. ii./21,166.

Oleum Cadini Aceticum.

Acetic Acid 1, Cade Oil 10. This and the former are used for alopecia. The following are used in psoriasis and dry eczema.

Unguentum Olei Cadini et Sulphuris.

Cade Oil 10, Sulphur 1, Vaselin 15, Lanolin 15.

Unguentum Olei Cadini.

Melt Yellow Beeswax 1, add Huile de Cade 1, and stir till cold. Lard may be used as a diluent if a weak ointment be required.

Unguentum Betulæ Compositum, St. G. H. Huile de Cade 10, Resorcin 1, Ichthyol 1, Oil of Sweet Birch 1, Lard 30.

Oleum Fagi Pyroligneum, Beech Tar.

On the Continent used as a source of creosote.

Linimentum Picis (Lassar).

Beech Tar 4, Birch Tar 3, Olive Oil 1, Alcohol (70%) 1.

Oleum Rusci Pyroligneum. Said to be obtained from **Butcher's Broom.** Is really identical with *Oleum Betulæ Pyroligneum*, **Birch Tar.** A yellowish-brown oil from *Betula Alba* (L.).

The above Oils are used instead of Tar in skin affections. The odour of russia leather is due to Birch Tar. They are all miscible with fats, but do not blend perfectly with alcohol.

Huile de Bouleau is obtained by distillation of *Betula Alba.*

No reason why Birch Tar should not be distilled in England or Scotland.—E. M. Holmes, P.J. i./21,508.

Unguentum Rusci Compositum. Birch Tar 30, Calamine 45, Resin Ointment 120, Zinc Ointment 120, Carmine Trituration 4, Liquid Paraffin 15. For chilblains, eczema, prurigo and psoriasis, and for irritation due to piles.

***Resinol** (T.M. 221588) **Ointment and Soap** are Proprietary preparations for skin eruptions and inflammations.

PLUMBUM.

Pb=207·2.

Plumbi Acetas. *Syn.* **Sugar of Lead, Saccharum Saturni** $Pb.(CH_3COO)_2.3H_2O=379·306$.

Dose.—1 to 5 grains (**0·06 to 0·3 Gm.**).

Colourless crystals or masses soluble in water 1 in less than 3; in Alcohol (90%) 1 in 30, in Glycerin 1 in 2.

Incompatible with Carbonates, Soluble Chlorides, Sulphates, Tannates, Potassium Iodide and Opium preparations. The *Subacetate* is incompatible with Acacia Mucilage.

Uses.—Astringent, *e.g.*, in severe diarrhœa, and as a hæmostatic (of doubtful value) in gastric ulcer; it is a powerful poison. Externally as lotion for eczema, leucorrhœa, gleet, pruritus and for bruises.

In mercurial stomatitis a wash of Lead Acetate (10 grains to the ounce) may prove soothing.—Yeo.—(? advisable. W. H. M.)

Antidotes.—Emetics or Stomach Tube, Magnesium or Sodium Sulphate followed by stimulants.

Atropine in full doses relieves colic and keeps bowels open.

Plumbic optical neuritis due to poisoning with lead paint treated with Dilute Sulphuric Acid and Saline laxatives, hypodermic injections of Pilocarpine (the latter continued for six weeks), after the first few days Potassium Iodide, 5 grains thrice daily for a child of 8 years.

Potassium Iodide must be used with caution—sudden death may occur due to the entrance of a large amount of soluble lead salt.

Care must be taken to distinguish a Lead line from a Mercurial gum line as in lead workers.—L. ii./12,1138,1166. *cf.*, Hydrargyrum, p. 472.

Lead poisoning from face enamel, which on analysis showed a very high lead content.—H. W. Woltman, per Clin. Jl., Jan. 24/23,48.

For some details of Lead Poisoning in the Potteries, etc., see Vol. II.

Glycerinum Plumbi Subacetatis (*Off.*).

This is similar to **Goulard's Extract—Liquor Plumbi Subacetatis Fortis** (*Off.*), with glycerin for the solvent in place of water.

Liquor Plumbi Subacetatis Dilutus (*Off.*), is 1 of the Concentrated Liquor with water *q.s.* to 80.

In chronic eczema the Glycerin of Subacetate of Lead is useful. It should first be applied diluted 1 part with about 7 of glycerin, or *better* 1 *with* 7 *of water*, and the strength gradually increased; it desiccates the eruption without producing a hard crust. Some uterine affections are well treated with the diluted glycerole. For inflamed joints after injury to bruised surfaces, lead lotion (warmed) is useful. It should be used with caution to the eyes if the cornea is damaged. In gonorrhœa compresses are used prior to injections.

Liquor (or **Lotio**) **Plumbi Lactatis** is 1 part of Solution of Lead Subacetate to 9 of Milk. A little Eau de Cologne may be added. For nettle rash and any skin irritation.

Leonard Bickle has found Lotio Plumbi of great service in severe burns and did not think any danger from absorption. It was superior to oil dressing. —Dec. 1914.

Unguentum Plumbi Subacetatis (*Off.*).

Strong Solution of Lead Acetate 1 in 8 in a compound basis.

Jelly-fish stings. Apply the following ointment. Lanolin 1, Paraffin Ointment 3, Almond Oil 4, Lime Water 8, Strong Solution of Lead Subacetate 4, Clove Oil $\frac{1}{2}$. Said to be superior to Carron Oil for this purpose.—Brooke.

Injectio Plumbi L.H. (*Vaginal*).

Strong Solution of Lead Acetate 60 minims, Water to 1 pint.

Lotio Plumbi Talci et Amyli. (Formula of Boeck of Christiania). Dilute Lead Subacetate Solution, Talcum, Starch, and Boric Acid Solution (1%) of each 10 by weight, Glycerin 4, Camphor Water 25. Relieves itching.

Ⓟ **Lotio Plumbi et Opii.**

Tincture of Opium 1 to 159 of Dilute Lead Acetate Solution (1 drachm to 1 pint).

[D][P1] **Solubes Plumbi et Opii** represent:—

Lead Acetate 2 grains, Opium Tincture 20 minims. For dilution with warm water 5 ounces, more or less according to the purpose required. Although used to a certain extent in this form, Opium is said to be entirely devoid of peripheral anæsthetic effects and Lead likewise, because the precipitation of proteins is prevented by the intervention of the epithelium.

Lotio Plumbi Spirituosa. Lead Subacetate Solution 1, Glycerin 2, Alcohol (90%) 4, Rose Water to 32. Relieves piles promptly.

Lotio Plumbi Evaporans, R.O.H.—Diluted Solution of Lead Acetate 4, Alcohol 90% 4, Water to 100.

Plumbi Nitras, $Pb(NO_3)_2$ = 331·216. Colourless or opaque crystals. Soluble in water about 1 in 2.

Ingrowing toenail treated with Lead Nitrate as dusting powder Remove scab that forms next day. Apply a little strong Phenol first,—this prevents pus which may form.—B.M.J. ii./13,746,939.

Plumbi Carbonas. CERUSSA, **Ph. Ned.** $2PbCO_3,Pb(OH)_2=775{\cdot}626$. Heavy white insoluble powder, soluble in dilute Acetic and Nitric Acids. Used as dusting powder for burns. 1 to 10% ointment in skin diseases.

Pasta Plumbi cum Cupro.—(A) Lead Carbonate 8 ounces, Mastich Varnish (*q.s.*) about 2 ounces, to make a thin paste. (B) Copper Sulphate, Zinc Sulphate and Lead Acetate of each 40 grains, rubbed together. Mix A and B and add Linseed Oil 1 ounce. This has been used with success in bad cases of erysipelas.—Ph. Notes.

Plumbi Iodidum $PbI_2=461{\cdot}04$.

Yellow crystalline powder. Used to reduce swellings. Very slightly soluble in water. 5 to 10% Ointment in skin diseases.

Plumbi Oxidum. *Syn.*—LITHARGE. $PbO=223{\cdot}2$.

Yellowish-red powder (Massicot) or scales. To prepare Lead Plasters.

Minium, P. Belg., *Red Lead,* $Pb_3O_4=685{\cdot}6$. Made by heating Massicot.

PODOPHYLLIN.

Syn. PODOPHYLLI RESINA.

Dose.—$\frac{1}{4}$ to 1 grain (**0·016 to 0·06 Gm.**) as a cholagogue and aperient pill or tablet. Takes 8 to 10 hours before producing evacuation.

The resin from the dried rhizome of *Podophyllum peltatum*—*Berberidaceæ* (*Off.* and U.S.)—American Mandrake, or May Apple, sometimes called Vegetable Mercury as it is a powerful biliary purgative. It is useful in removing *ankylostoma* and other worms. Yellowish powder, soluble in aqueous ammonia and almost completely in 90% Alcohol.

U.S. requires Podophyllin not less than 75% soluble in ether, and not less than 65% in chloroform.

Fluidextractum Podophylli, U.S. 1=1. *Average dose.*—8 minims

Podophylli Indici Resina (*Off.*). From *P. Emodi* (also now *Off.*). Is richer in Podophyllotoxin than that from *P. peltatum.*

Podophyllotoxin. $C_{20}H_{15}O_6(O.CH_3)_3+2H_2O=480{\cdot}339$.

Is the principal constituent of Podophyllin. It is more certain in its action than Podophyllin and is given in dose of $\frac{1}{10}$ to $\frac{1}{8}$ grain, to children $\frac{1}{30}$ to $\frac{1}{30}$ grain. It is best administered by dissolving 1 grain in 2 drachms of 90% alcohol. *Dose.*—8 to 20 drops in a teaspoonful of syrup.

For further details of this body, see Vol. II.

℗ **Pilula Podophyllin Composita.**

Podophyllin $\frac{1}{4}$ grain, Barbadoes Aloes 1 grain, Capsicum $\frac{1}{2}$ grain, Green Extract of Belladonna $\frac{1}{4}$ grain, Excipient *q.s.* for one pill weighing 3 grains. One or two form a biliary aperient dose.

℗ **Pilula Podophyllin et Quininæ (Poore's Pill).**

Quinine Sulphate 1 grain, Podophyllin $\frac{1}{12}$ grain, Milk Sugar $\frac{1}{12}$ grain, Green Extract of Belladonna $\frac{1}{6}$ grain, Extract of Aloes 1 grain. To make one pill, or, if the quantities be taken in grammes, 15 pills, weighing 3 grains: useful 'dinner pills,' must be taken *with* food.

℗ **'Dinner Tablets'** are similar; weigh 3 grains. They are recommended not coated for prompt action.

℗ **Pilulæ Podophylli, Belladonnæ et Capsici,** U.S. VIII.—100 pills contain Podophyllum Resin 1·6 Gm.; Extract of Belladonna leaves 0·8 Gm., Capsicum 3·2 Gm., Sugar of Milk 6·5 Gm., Acacia 1·6 Gm., Glycerin and Syrup *q.s.*

Tinctura Podophylli (*Off.*).

Dose.—5 to 15 minims (**0·3 to 1 Cc.**).

Podophyllin 3·65% in Alcohol 90%.

Flavoring.—Syl Lavandulæ (double dose), Syl Amygdalæ Amaræ; Syrupus Zingiberis, Elixir Saccharini.

In dose of 2 to 4 drops in tea or coffee, taken night and morning, is useful in sick headache and biliousness, where the bowels and liver are sluggish in worried and overworked patients, and in chronic diarrhœa with cutting pains and high-coloured motions. Also relieves constipation with clay-coloured motions following diarrhœa of infants, 1 or 2 drops on sugar twice or three times a day.—R.

Tinctura Podophylli Indici (*Off.*) is also made same strength.

Tinctura Podophyllin Ammoniata.

Podophyllin 1, Aromatic Spirit of Ammonia 50. Dissolve, and after standing, decant. Is miscible with water.

Dose.—10 to 20 minims (**0·6 to 1·2 Cc.**), diluted, as a purgative and cholagogue. The sal volatile acts as a corrective.

✱**Chologen** (T.M. 253036) **Tablets** are given to dissolve gall stones and check cholelithiasis. Supplied in 3 strengths:—

(i.) Calomel $\frac{1}{12}$ grain, Podophyllin $\frac{1}{6}$ grain, (ii.) Calomel $\frac{1}{20}$ grain, Podophyllin $\frac{1}{12}$ grain, (iii.) Calomel and Podophyllin $\frac{1}{25}$ grain each, also Camphor $\frac{1}{25}$ grain and small doses of Caraway Oil and Balm (Melissa) Oil.—Gehe. To be taken over lengthy periods.

POTASSIUM.

K=39·10.

Sources of Potash Salts.—Potassium Chloride is obtained from the Strassfurt mines, also as *Sylvine* at Mulhouse in Alsace, and could be worked commercially from Felspars in Scotland.—Sir T. E. Thorpe, B.M.J. i./18,64.

Potassa Caustica, Potassii Hydroxidum. KOH=56·108.

Manufactured by interaction of Potassium Carbonate and Calcium Hydroxide. White deliquescent sticks or cakes. (*Off.*) not less than 85% pure. ***Soluble*** in water 2 in 1, and about 1 in 3 *w/v.* of 90% alcohol.

Incompatibles—Acids, metallic salts, and alkaloidal salts.

Antidotes.—Any dilute vegetable acid, fixed oils, stimulants; not stomach pump or lavage.

Given in mixtures as **Liquor Potassæ** (*Off.* 5% *w/v.*), well diluted; also used as a caustic.

A Liquor containing 5 Gm. of KOH in 100 Cc. has Sp. Gr. 1·045. P.G.V. is 15% *w/w.* Sp. Gr. 1·138 to 1·14.

Flavoring.—Syl Menthæ Piperitæ, Syl Amygdalæ Amaræ.

Liquor Alkalinus, Brandish.

Dose.—For adults, up to 2 drachms. For ages 14 to 18 years 2 drachms, for children ½ to 1 drachm diluted. All these doses should be given diluted with milk or syrup.

This liquor consists of a 5% Aqueous Caustic Potash. In scrofula.—Hager.

Vienna Paste.—Caustic Potash 5, Slaked Lime 6, made into a paste with Alcohol. Used as an escharotic.

Pasta Londinensis is similar. Caustic Soda and Unslaked Lime of each equal parts, rubbed together in a warm mortar—made into paste when required for use as a caustic.

Potassa Sulphurata (*Off.*). Liver of Sulphur. Deliquescent yellowish brown masses, smelling of sulphuretted hydrogen. Used in skin affections. **Balneum,** 2 ounces to 15 gallons.

The total Sulphur should be estimated. The 1898 B.P. product would contain 42 to 45%.—D. L. Howard, P.J. ii./12,150,222. This is now *Off.*—estimated as Barium sulphate.

Unguentum Potassæ Sulphuratæ. Liver of Sulphur 1, Sodium Carbonate 1, Lard 8. For ringworm.

Potassii Acetas. $CH_3COOK=98{\cdot}134$.

Dose.—10 to 60 grains (**0·6 to 4·0 Gm.**).

Deliquescent white crystals, masses or powder. Antilithic, diuretic and uric acid solvent. Soluble in Water 2 in 1, in Alcohol (90%) 1 in 2.

Flavoring.—Syl Pini, Syl Lavandulæ, Syrupus Aurantii.

To prevent puerperal eclampsia. Keeps the urine alkaline if given in sufficient dose, but will not cure the albuminuria; it does, however, prevent eclampsia.—B.M.J. ii./09,550.

Mistura Diuretica, St M.'s H.

Potassium Acetate 20 grains, Sodium Nitrite ½ grain, Spirit of Juniper ½ drachm, Tincture of Ginger 10 minims, Water to 1 ounce.

The following is a useful mixture:—Potassium Acetate 20 grains, Solution of Ammonium Acetate 2 drachms, Vinegar of Squill 20 minims, Infusion of Broom 2 drachms, Water ½ ounce.

Potassii Benzoas. $C_6H_5COOK.3H_2O=214{\cdot}223$.

Dose.—15 to 20 grains (**1 to 1·2 Gm.**). White crystals. Soluble in water 1 in 1½ and in alcohol (90%) 1 in 20. Uric Acid Solvent.

Flavoring.—Syl Aurantii Floris, Syl Vanillæ; Syrupus Aurantii.

Potassii Bicarbonas $KHCO_3=100{\cdot}113$.

Dose.—5 to 20 grains (**0·3 to 1·2 Gm.**).

White powder or crystals soluble 1 in water 4. Insoluble in Alcohol (90%). Antacid, diuretic, and Uric Acid solvent. It is most valuable in acute rheumatism.

Endocarditis is benefited by free administration, *e.g.*, 1 drachm doses in solution added to fresh lemon juice.—Whitla.

Flavoring.—Syl Cinnamomi, Syl Lavandulæ.

Potassii Bichromas. $K_2Cr_2O_7=294{\cdot}2$.

Dose.—$\frac{1}{10}$ to $\frac{1}{5}$ grain (**0·006 to 0·012 Gm.**), in pill with Kaolin Ointment or in Capsule has been used in dyspepsia and gastric ulcer. Soluble 1 in 10 of water.

Antidotes. See **Antidotes to Poisons.**

In phthisis (2½ minims of 10% Solution in water) either alone or in a tonic mixture in a wineglass of water after food, at first twice and later three times daily, produced improvement in several cases. May produce vomiting at first.—L. ii./10,1484. Poisoning by.—L. ii./07,1758

Potassii Bromidum, K Br=119·02.

Dose.—5 to 30 grains (**0·3 to 2 Gm.**). Slipule No. 0 holds 10 grains.

Colourless or white crystals with saline taste. Soluble in water 1 in less than 2, and in about 200 of alcohol 90%. It should be at least 97% pure.

Incompatible with Mineral Acids, Mercury and Silver Salts.

Flavoring—Glyl Rosæ, Syl Vanillæ; Syrupus Zingiberis, Extractum Glycyrrhizæ Liquidum.

Uses.—Hypnotic and sedative, and is given as a drink cure. Often given with other bromides, *cf.*, Sal Bromatum, and with Chloral Hydrate, Arsenic or Belladonna.

Potassium Bromide with Nux Vomica will keep a patient free from epileptic fits whilst treatment is persisted in.—L. i./10,355.

In recent epilepsy should be given for a long period (not less than two years). If no benefit from 45 to 75 grains per diem some other remedy should be tried. (It is cumulative). Addition of Belladonna may be useful where there is incontinence.

The following mixture has been recommended :—

Potassium Bromide 1 ounce, Potassium Iodide 2 drachms, Ammonium Bromide 3 drachms, Ammonium Carbonate 1 drachm, Tincture of Calumba 1 ounce, Water to 6 ounces. One teaspoonful before each meal and three teaspoonsful at bedtime. If *petit mal* exists alone, or co-exists with complete epilepsy the dose of Ammonium Bromide must be increased and that of the other diminished.

To avoid the onset of Bromism give Fowler's Solution of Arsenic, and maintain the antisepsis of the bowels by purgatives and salol.

For erections in gonorrhœa 15 to 35 grains with Lupulin 1 to 2 grains and Camphor 1 to 2 grains in a cachet, two to four daily.—Pr. Apl. '09,543.

Patients saturated with Bromides exhibit anæsthesia of the palate —a little known but useful diagnostic. Tickling the palate with a feather is a good means of eliciting the information. The effect of Bromides is enhanced by adding Potassium Bicarbonate in doses equal to about a quarter of the total Bromide given.—Craik Taylor.

Small doses, *e.g.* 5 grains once a day long continued is far more efficacious than larger doses for shorter periods.—M. Craig, L.ii./17, 979.

Puerperal eclampsia is treated with it combined with Belladonna.

Tablets contain 5 and 10 grains.

℗Mistura Dysmenorrhœica, E.G.A.

Potassium Bromide 15 grains, Sal Volatile, Tincture of Hyoscyamus *a.a.* ½ drachm, Spirit of Chloroform 10 minims, Water to ½ ounce.

Elixir Quinque Bromidorum. Can. Form.

Potassium and Sodium Bromides of each 10, Ammonium Bromide 6, Calcium Bromide 3, Lithium Bromide 1, Tincture of Cannabis Indica 6, Aromatic Elixir, sufficient to make 120. Dis-

solve the Bromides in the aromatic elixir, add the Tincture of Cannabis Indica, and filter if necessary. *One drachm contains* 15 *grains combined Bromides.*

Potassii Carbonas.

Syn. SALT OF TARTAR. K_2CO_3=138·205. *Dose.*—5 to 20 grains (**0·3 to 1·2 Gm.**).

White deliquescent powder. Soluble in water 4 in 3, insoluble in alcohol 90%. Employed chiefly as lotion externally; internal properties similar to those of the Bicarbonate. Commercially contains about 16% H_2O.

Potassii Chloras. $KClO_3$=122·56.

Dose.—5 to 15 grains (**0·3 to 1 Gm.**).

Manufactured by passing chlorine into water holding lime or magnesia in suspension, treating the clarified liquid with Potassium Chloride, and crystallising the resulting chlorate from the liquor. Colourless crystals with saline taste. ***Soluble*** in water 1 in 16.

Incompatible with Oxidisable substances, Ferrous Salts, Sugar, Nitrites, Calomel, Hypophosphites, Vegetable Powders, Potassium Iodide.

Uses.—Antiseptic and a powerful oxidising agent. Is useful in stomatitis *e.g.* in children and in sore mouth arising from Mercurial treatment. Must not be given when the kidneys are diseased.

Poisoning by 20 Gm. Transfusion of defibrinated human blood tried. Death.—L.ii./07,1175.

Habitual natural abortion treated by Potassium Chlorate—successful. The oxidising effect may assist to prevent or limit the production of the so-called toxæmia in pregnancy.—L. i./11,1222.

Water sterilisation for troops by Chlorine liberated from, *vide Vol. II.*

Lozenges weighing 20 grains, and **Tablets** weighing 5 grains, **plain and Ⓟ with Borax and Cocaine** $\frac{1}{260}$ grain, are useful to allay irritation and improve the voice. Gargle, spray, mouth wash may be 2% strength. Chlorine Gargle is made from it.

Pulvis Potassii Chloratis Compositus, C.L.T.E.

Potassium Chlorate 1, Borax 1, Sodium Bicarbonate 1, Sugar 2. Forms the solids of :—

Collunarium Potassii Chloratis Compositum, C.L.T.E.

Directions.—One teaspoonful to be dissolved in a quarter pint (½ tumbler) of tepid water. Half of the solution to be injected with a syringe along the floor of each nostril night and morning. Afterwards blow the nose freely.

Chloratifrice, a tooth paste, contains this Salt. For spongy gums and to prevent Tartar and act as a general antiseptic.

Potassii Chloridum. KCl=74·56.

Has been advocated for use in place of table salt by gouty and rheumatic individuals; the following is better to taste :—

Pulvis Potassii et Sodii Chloridi Compositus.—*Oliver.* Potassium Chloride 16, Sodium Chloride 8, Lithium Benzoate 1. A half-drachm measureful to be taken.

The late Sir W. Roberts advocated Potassium Chloride for increased arterial pressure. Oliver found a tendency to indulge in the use of salt in advancing age (over 65). When Potassium is ingested in excess of Sodium, a loss of the latter takes place from the system.

Potassii Citras. $C_3H_4(OH).(COOK)_3$, H_2O = 324·386.

Dose.—15 to 60 grains (**1 to 4 Gm.**).

A white powder obtained by neutralising citric acid with potassium carbonate. It has diaphoretic, diuretic, and febrifuge properties. Also for gout, and in enuresis where the urine is over-acid. Large doses are useful for the acidæmia of diabetes.

Potassium Citrate has the peculiar property of dividing Aqueous Alcohol solutions into layers consisting of more or less pure alcohol in the upper and aqueous salt solution in the lower.

Flavoring.—Syl Anisi, Syl Sassafras; Elixir Saccharini; Syrupus Pruni Virginianæ.

Removes œdema in disease of the gastro-intestinal tract in infants. Appears to act better than other diuretics.—Pr. May, 1911, p. 686.

Neurotic dyspepsia. Sip early in the morning a tumbler of hot water containing a teaspoonful of it.—B.M.J. ii./11,1529.

Lactation improved by 15 grain doses.—B.M.J. i./17,765.

'Vescettes' of Potassium Citrate, 15 grains.

To be crushed and taken in a draught of warm water.

℗ **Potassii Cyanidum** KCN=65·113. Fr. Cx.

Dose.—$\frac{1}{12}$ to $\frac{1}{4}$ grain (**0·005 to 0·016 Gm.**).

Fr. Cx. has *mar. single dose* $\frac{1}{6}$ grain. Max. during 24 hours $\frac{5}{8}$ grain.

A crystallised salt or in fused masses.

Antidotes.—See Acid Hydrocyanic.

℗ Trade Varieties. In addition to the B.P. salt (about 95% pure) are '**Gold Cyanide**' 98 to 100%, really a double Cyanide of Potassium and Sodium, but, we understand, the B.P. article is also used for gold extraction. 30% pure is supplied in sticks; this is 'silver cyanide,' for silver extraction.

Potassii Ferrocyanidum.

$K_4Fe(CN)_6,3H_2O$=422·366. *Dose.*—8 grains (**0·5 Gm.**).

Said to be physiologically almost without action.—P.J. ii./05,924.

Potassii Iodidum. KI = 166·02. *Dose.*—5 to 20 grains (**0·3 to 1·2 Gm.**)—often much increased.

In white or colourless cubic crystals or **Small Granular Crystals** soluble in less than its own weight of water, and in 12 parts of Alcohol 90%.

A slightly alkaline solution keeps better than an acid one. ***Incompatible*** in solutions with Spiritus Ætheris Nitrosi, Salts of Iron (except Ferri et Ammonii Citras and Liquor Ferri Acetatis), Salts of Bismuth, Lead and Mercury, with Liquor Strychninæ Hydrochloridi, with Quinine Sulphate and other alkaloidal Salts, Silver Nitrate and Potassium Chlorate.

Flavoring.—Syl Lavandulæ, Glyl Menthæ Piperitæ, Syl Vanillæ, Extractum Glycyrrhizæ Liquidum, Syrupus Zingiberis.

Uses.—In universal use in the later stages of syphilis, in arteriosclerosis and certain cases of gout and rheumatism.

For actinomycosis it is specific; very large doses are given. In one case (severe) it was only when the dose reached 240 *grains daily* that *improvement began.* Carbolic Lotion 1 in 80 was quite sufficient locally. THOMASSEN'S METHOD is 10 grains thrice daily for the first *week*, 15 grains the second, and 20 grains the third, increased to 35 grains. Sporotrichosis and blastomycosis, also respond. In actinomycosis Potassium Iodide *not* found effective.—Colebrook, B.M.J. i./22,74. Blastomycosis well treated.—A. Castellani, L. i./20,943.

Rheumatoid arthritis best treated by 10-grain doses thrice daily with Guaiacol Carbonate.—A. P. Luff; *see* also p. 398.

In fibrositis it is perhaps the most valuable drug. It appears to act by removing the hyperplasia and serous exudation in the fibrous tissues. Full doses (10–12 grains) with Nux Vomica or Syrup of Glycerophosphates.—A. P. Luff.

Administration of Potassium Iodide in large doses is a survival of the old AIX-LA-CHAPELLE TREATMENT for late specific lesions—quite unabsorbed. Free Iodine is less irritating than Potassium Iodide or Sodium Iodide in large doses. 10 grains of Potassium Iodide thrice daily for less than a week has produced violent catarrh with discharge from eyes and nose, swelling of eyelids and pustular eruption. Tincture of Iodine 5m. thrice daily is well borne.—'Indian Physician,' C.D. April 2,21,475.

In rheumatism, Potassium Iodide must be taken internally. It is rapidly absorbed from the mucous membrane, but not by the skin. The liniment of Potassium Iodide with soap and the ointment of Potassium Iodide are a waste.—D. Grieve, C. & D., Dec. 1921, p. 856.

Exophthalmic goitre, discussion on. Small doses of Iodide, *e.g.* Sodium Iodide 3 grains daily, for 10 days each spring and autumn found efficacious in girls in reducing the number of cases of goitre in districts where it is endemic, and it is not unreasonable to expect that by reducing the tendency to *simple goitre in early life*, we may also lessen the number of cases of *Graves' disease occurring in later life.* This preventive treatment is, however, quite *unsuited for those who already show signs of hyperthyroidism.*—G. R. Murray, B.M.J. ii./22,908. Speakers differed on the question of Iodide treatment.

Goitre endemic in the valleys of E. & N.E. Lancashire. 2½ or 3 grains of Sodium Iodide thrice daily for six weeks, then discontinued for a month and resumed indefinitely. Large goitres disappear.—R. Stewart, B.M.J. ii./21,843.

Iodine (Potassium Iodide) in small doses will prevent and cure simple goitre. CHLORINE to some extent also prevents thyroid enlargement. Iodine deficiency comes about through absence of Iodine from food, vegetables, etc.—R. McCarrison, B.M.J. i./22,636.

GOITRE AND CALCIUM have obvious relationship. The viscosity of the thyroid secretion varies immensely. This depends on its Iodine content. In limestone districts (Switzerland and DERBYSHIRE) large goitres containing thick colloid are usual. This 'colloid' is poor in Iodine. These goitres vanish under use of Iodine or Thyroid preparation rich in Iodine. The Iodine combines with the Calcium to form Calcium Iodide.

Further, fat taken above normal requirements will form soaps with the fatty acids combining with all the Calcium (and other alkalies) present. This will lead to Calcium starvation. The part played by fat in the production of goitre is only a link in the chain of Calcium absorption or starvation.—S. Pern, B.M.J. ii./22,532.

SWITZERLAND is attacking the goitre problem. CHATIN'S HYPOTHESIS (enunciated in 1850) is thought to be correct there, namely that it is correlated with a low Iodine content of drinking water.

Baumann concluded that the (goitrous) thyroid gland seeks, by increase in size and surface to make up for the lack of Iodine in neighbourhoods where the supply is scanty. Chatin demonstrated how *poor in Iodine is the water in Alpine Valleys.* The same has been found in U.S.A. The sea spray is thought responsible for carrying the Iodine hundreds of miles from the sea coast and from the Great Salt Lake.

As small an amount as 0·1 mgr. of Potassium Iodide thought to have anti-goitrous action. Table salt could be used dietetically. **'Vollsalz'** containing 0·25 to 0·5 Gm. Potassium Iodide to every 100 kilos in use in the Canton of Appenzell. A sensible measure.—L. i./23,660.

A normal thyroid contains a relatively higher quantity of Iodine per Gm. of gland than a goitrous one, and the Iodine content is rapidly increased in many forms of goitre during administration. Small doses of Iodine or Thyroid to be given three times a day over a long period.—Beebe, B.M.J.E. ii./21,29.

The following are older refs. on the matter:

In exophthalmic goitre it is *to be avoided.* Iodine is being poured into the system in excess by thyroid secretion.—B.M.J. ii./05,1249.

Goitre and Iodine compounds. The best effects of Iodine on the thyroid are only obtained by doses much smaller than those usually employed.—B.M.J.E. ii./08,12.

A case of Thyroid enlargement not goitre; rapid resolution under Iodide. Interesting in that Iodides often cause enlargement of the thyroid gland.—B.M.J. i./09,1064.

See also Sodium Iodide, p. 749 *and Endemic Goitre,* p. 895.

In asthma, Potassium Iodide in 5–15 grain doses twice or thrice daily. Extract of Stramonium may be added. Reliable both during the paroxysms and in the interval.—Yeo.

In aneurism moderate to full doses.—Yeo. The addition of Ammonium Bromide is often useful.

In raised arterial tension where source of danger, 1 to 10 grains thirce daily for fortnightly periods with intervals of a week beneficial.—Brunton.

In arteriosclerosis 3 to 5 grain doses thrice daily with Potassium Bicarbonate 5 to 10 grains, Sal Volatile 20 minims, and an ounce of Gentian Infusion continued for four months at a time with interruptions of ten or twelve days. One or two tablets of Nitro-glycerin as well to promote vascular relaxation.—Yeo.

In dry forms of disease of the middle ear.—B.M.J. ii./04,1206,1209.

In tinnitus aurium associated especially with vertigo, due to labyrinthine disease, may be used in large doses.

Acute parotitis favourably treated by painting the swelling with Iodine and giving Potassium Iodide internally.—B.M.J. i./06,81.

Obstructive lymphangitis well treated with Potassium Iodide.—S. L. Rodriguez, per Clin. Jl., Feb. 14/23,83.

Tuberculous expectoration is greatly assisted by its use.

In lobar pneumonia for the combined use of Potassium Iodide and Creosote, *vide* **Mistura Creosoti et Potassii Iodidi,** p. 393.

In bronchial affections the Iodides cause a watery exudation through the bronchial mucous membrane. They are excreted through this and other mucous membranes. In some cases Iodine itself is liberated, leading to 'iodism'—the result is a bathing of the infected membrane with healing muco-serum.—P.R.S.M., Therap., Sect—1911, p. 41.

Sterules, Hypodermic, of **Potassium Iodide** contain 5 grains.

Pilula Potassii Iodidi.—Contains 1 grain or more.

Potassium Iodide 1 grain, Sodium Carbonate Exsiccated $\frac{1}{8}$ grain, with Tragacanth and Syrup. **Tablets** and **Capsules** contain 5 grains.

Potion Iodurée

Potassium Iodide 0·5 Gm., Syrup of Orange 25 Gm., Distilled Water 100 Cc., to be taken in three portions during the day.

Spirone Inhalant (*Churchill's*)

Pharm. Form. says.—A solution of Potassium Iodide in a mixture of Acetone 1, Glycerin 2, and Water 13. The Iodide is in the proportion of about 8 grains to the ounce. For use in phthisis.

Linimentum Potassii Iodidi cum Sapone (*Off.*).

Mix fresh Curd Soap in fine shreds 16 with Water 80, and Glycerin 8, in a porcelain dish on a water bath. When dissolved, pour the liquid on to Potassium Iodide 12 in powder in a mortar. Triturate briskly until cold. Set aside 1 hour; and add Lemon Oil 0·8.

A soft **jelly-form Liniment of Potassium Iodide and Soap** may be produced with Soft Soap ½, Potassium Iodide 1½, Glycerin 1, Water 10. The following is somewhat stiffer: Soft Soap 1, Potassium Iodide 1½, Glycerin 1, Water 10.—P.J. ii./04,376.

Potassii Nitras KNO_3=101·108. *Syn.* NITRE. *Dose.*—5 to 20 grains (**0·3 to 1·2 Gm.**). Should be given well diluted.

Flavoring.—Syl Rosæ, Glyl Lavandulæ, Syrupus Tolutanus.

In chronic pericarditis great alterations in the area of dulness may follow the employment of diuretics such as preparations of Potassium Nitrate, Squill, Digitalis or Scoparium.—Tirard, Med. Treatment.

In pneumonia all the free chloride in the body is held by the exudate. The chloride content of the body is called upon, and the urine becomes almost salt free. At the crisis the exudate is liquefied and chlorides reappear in the urine. The sudden liberation of chlorides into the circulation seems to conduce to heart failure and fatalities. The crisis should be hastened, and the sudden outpouring of chlorides be made more gradual. Sodium chloride can be displaced by sodium bicarbonate, neutral potassium phosphate and potassium nitrate. Potassium nitrate in full doses causes the sodium chloride to reappear in the urine in a few hours, and to continue present so long as it is given. The diet should be salt-free. The effect is remarkable; temperature falls in a few hours. Give 60 grains in solution every 3 hours for the first day, and then gradually reduce the dose each succeeding day. To increase circulation in the lungs nitroglycerin $\frac{1}{100}$ to $\frac{1}{50}$ gr. every three hours.—H. G. Hughes, N. Y. M. Jl., Sept. 9,1911, Pres., Dec., 1911, p. 300.

Poisoning by Potassium Nitrate.—B.M.J. i./11,1,052.

Antidotes. See **Poisons** and **Antidotes.**

Fumus Potassii Nitratis (Nitrated Papers).

White blotting-paper, impregnated with 20% Nitre solution. To relieve asthma these are burnt and the fumes inhaled.

Asthmatic Pastilles are prepared in cones containing a mixture of chlorate and nitrate of potassium.

Pulvis Lobeliæ Compositus. ASTHMA POWDER.

Potassium Nitrate 240, Boiling Distilled Water 240. Dissolve and add to Lobelia in powder, Stramonium Leaves in powder, Black Tea in powder, 240 of each. Mix well, dry, and add Oil of Anise 1. The fumes of half a teaspoonful or more to be inhaled six or eight times a day and the bedroom fumigated with same. ✱Himrod's Cure (T.M. See 169033 and 25857) Bliss's Cure, and the Green Mountain Cure resemble the above.

Asthmatic Cigarettes contain Stramonium treated with Nitre

℗ [P1] **Cigarettes d'Espic** are said to be made of the following ingredients:—Belladonna Leaves 5½, Hyoscyamus Leaves 2¾, Stramonium Leaves 2¾, *Phellandrium Aquaticum* 1, Opium Extract 1⅛, Cherry Laurel Water a sufficiency and a little Potassium Nitrate.—Yeo.

Exibard's Abyssinian Fumigating Powder contains plant powders and balsams.

***Garfield's Tea** (T.M. 282807). is stated to have the formula :—
Senna 30%, Couch Grass 33%, Balmony 20⅔%, Dandelion 3%, Centaury 3%, Pellitory 3%, Mallow 3%, Chamomile ⅓ of 1%, Hyssop 3%, Peppermint 1%.

Anasarcin Elixir. *Dose.*—4 drachms (15 Cc.) every two hours.
An American preparation stated to contain *Sambucus canadensis*, *Oxydendron arboreum*, *Hepatica americana* and potassium nitrate. As a diuretic cholagogue and antiasthmatic. **Anasarcin Tablets,** *Dose.*—½ to 2 thrice daily. Weigh 10 grains approximately and are chocolate-coated.

Effervescent Potassic Aperient.

Dose.—One drachm in half a tumbler of warm water.

A preparation containing **Potassium Sulphate** K_2SO_4=174·27 Suggested as an alternative to Sodio-Magnesian Aperient (*q.v.*) also prepared with **Potassium Sulphocarbolate** 10 grains in a *dose* as (above). Useful where gastric and intestinal fetor are present.—Colin Campbell.

Foul smelling evacuations treated by Calomel ⅙ to ¼ grain at night followed in the morning by a dose of this.—H. J. Thorpe, B.M.J. ii./12,344.

Potassium Sulphate 0·25 to 0·5% added to local anæsthetics whether by spinal injection or peripheral blocking of nerves enhances anæsthesia.—Col. H. M. W. Gray, B.M.J. i./16,5

Potassii Nitris. KNO_2=85·108.

Dose.—¼ to 1½ grains (**0·016 to 0·1 Gm.**).

A crystalline deliquescent powder. It is a vasodilator, improves the cerebral circulation and is given for migraine, asthma and epilepsy.

Pulvis Potassii Nitritis Compositus.

Potassium Nitrite ½ grain, Potassium Nitrate 18 grains, and Potassium Bicarbonate 25 grains; mix and dispense in parchment paper. This dose may be given every morning in a tumbler of water to reduce blood pressure; is diuretic. Has thus checked recurrent epistaxis. Should be tried for gout.

Pulvis Sodii Nitritis Compositus.—Brunton.

Sodium Nitrite ½ to 2 grains, Potassium Nitrate 10 to 20 grains, and sometimes Potassium Bicarbonate 10 grains—in a tumbler of water every morning—to reduce blood pressure. May be taken for years.

Potassii Phosphas. **Di-potassic Hydrogen Phosphate.**
K_2HPO_4=174·248. *Dose.*—1 to 10 grains (**0·06 to 0·6 Gm.**).

A deliquescent granular powder; is given as an alterative in phthisis and urinary affections.

Sal Polychrestum. *Syn.* **Glaser's Salt.**

Dose.—30 to 120 grains (**2 to 8 Gm.**).

A mixture of Potassium Sulphite and Sulphate, has a sulphurous odour, has been given for dyspepsia and for chronic skin diseases.

Sal Enixum is **Potassium Bisulphate.** $KHSO_4$=136·168.

Potassii Sulphocyanas (Sulphocyanide). KCNS=97·173.

Dose.—¾ to 3 grains (**0·05 to 0·2 Gm.**). Not legally [℗] or Ⓟ but to be supplied with caution.

Has been employed as antispasmodic and anodyne—in phthisical cough and catarrh, dyspnœa, and mania.

Tooth Powders, Pastes and liquid Dentifrices. Suggested use of this or other alkaline sulphocyanide in neutral media. For powder 1 to 14 of precipitated chalk. For liquid dentifrice 1 to 8 of alcohol. Subject of patent,—F. J. Rhodes, No. 20879 of 1914.—P.J. ii./15,362.

Potassii Tartras.—Normal or Neutral Potassium Tartrate.

$(CHOH)_2COOK.COOK, \frac{1}{2}H_2O. = 235{\cdot}260.$

Dose.—30 to 240 grains (**2 to 15 Gm.**).

Crystalline powder with bitter taste made by neutralising Acid Potassium Tartrate with Potassium Carbonate. Has purgative and diuretic properties.

Soluble.—About 5 in 3 of water.

Potassii Tartras Acidus. (*Off.*)—*Syn.* **Potassii Bitartras.** Purified Cream of Tartar. $(CHOH)_2COOK.COOH = 188{\cdot}16.$

Dose.—15 to 60 grains (**1 to 4·0 Gm.**).

The crude tartar deposited during the fermentation of wine—recrystallised. A white powder with acid taste soluble 1 in 200 of water. Diuretic and cathartic. Is employed in acute renal disease. Where the urine is thick and alkaline, this salt neutralises and produces normal appearance.

Puerperal eclampsia. The convulsions may be the signs of œdema of the brain, hence aim at treating the œdema rather then the defect of the kidneys. Very small frequent doses of Potassium Bitartrate caused increased diuresis in a case and effected cure of eclampsia.—B.M.J.E. i./13,70; B.M.J. i./13,1207.

Haustus Imperialis, K.C.H., **Imperial Drink.** Potassium Bitartrate and Tartaric Acid of each 1 ounce, Sugar 16 ounces, Lemon Oil 12 minims, Boiling Water 1 gallon.

Carbuncle on the neck was treated by Cream of Tartar Powder as a dressing. Renewed from time to time and irrigated with sterile water.

Potus Imperialis, G.N.C. Lemon Syrup 1½ ounces, Acid Tartrate of Potassium 1 drachm, Water to 20 ounces.

Potassii Boro-Tartras. Soluble Cream of Tartar.

Dose.—20 to 40 grains (**1·2 to 2·5 Gm.**).

An amorphous white powder. Potassium Acid Tartrate 5, Borax 2. Dissolve with heat in water, *q.s.*, and evaporate to dryness.

Soluble to extent of 1 in 1 of water.

Uses.—Similar to that of Cream of Tartar.

Epilepsy has been treated with it—as much as 3 Gm. daily, sometimes combined with Bromide.—B.M.J.E. i./22,57; L. i./22,446; Pres. Feb. 21, 68, Jan. '23,23.—*cf.* Sodium Borate.

QUINIDINE, CINCHONIDINE, CINCHONINE AND CINCHONA FEBRIFUGE.

In Cinchona Bark there are a number (14 or more) of closely related alkaloids, all of them exerting a destructive action on the malarial parasite, but differing in the degree of destructive power. In *benign tertian* infection (which constitutes some 50 to 75% of cases—in India and in England among returned troops it is practically the only malarial infection seen), dextro-rotatory Quinidine is more efficacious than the lævo-rotatory Quinine.

The isomeric relationship between Quinine and Quinidine has been pointed out, and as Quinine is lævo-rotatory and Cinchonine dextro-rotatory it seems probable that Quinine (generally regarded as a methoxy derivative of Cinchonine) is not derived from the last mentioned. The correct relationship may be viewed by dividing into 2 series, thus :—

Cinchonidine Series = Cinchonidine, Cuprein and Quinine.
Cinchonine Series = Cinchonine, Cupreidine and Quinidine.

The dextro-rotatory (' Cinchonine series '), are more powerful than the lævo isomerides—the Cinchonidine series. The hydro alkaloids are more stable and more active in many respects than the natural alkaloids. The higher members of both series are more toxic to mammals, protozoa and bacteria than the lower members. Parasiticidal action can only be arrived at by direct observation on malaria patients.—Hugh W. Acton, L. i./22,124,283.

In a previous paper (L. i./20,1257) Maj. Acton pointed out that malarial fever should be regarded, not as one disease, but a group of three different fevers due to three distinct parasites, and two at least of these require different alkaloids of Cinchona Bark.

The cure rate produced by Quinine is 90% or over in malignant tertian cases, 20 to 30% in benign tertian and under 20% in quartan infections.

Cinchona Febrifuge.—A preparation containing the total alkaloids from Cinchona Bark made at the Government factories in India issued in 3½ grain tablets is described by Acton *(loc. cit.)*.

The composition is :—

		Per cent.
Crystallisable alkaloids ..	Cinchonine ..	18·58
	Cinchonidine ..	5·84
	Quinine	7·4
	Quinidine ..	22·83
Non-crystallisable alkaloids ..	" Quinoidine " ..	29·12
Ash		16·23

The tablets contain Magnesium Sulphate to assist in manufacture, hence the large amount of ash. Those made by the author do *not* contain this addition.

The crystallisable alkaloids, according to Acton, are the important ones from the therapeutic point of view; the non-crystallisable as contained in the **Laverain** remedy were non-effectual; all cases treated with it relapsed.

Quinine can be dismissed as the active constituent—it is only present to the extent of 7·4% in Cinchona Febrifuge and as already stated it produces a low cure rate in benign tertian infections.

Cinchonine resulted in relapses : it is toxic and badly tolerated.

Tests were made with Quinidine and Cinchonidine. **Quinidine Sulphate** 10 grains *per os* twice daily for 21 days gave cure percentage 62·9.

Cinchonidine Sulphate gave cure percentage 63·1.

It is clear from the paper, that the efficacy of the total alkaloids is dependent largely on the **Quinidine** content or the **Cinchonidine-Quinidine** mixture.

The parasiticidal action of the alkaloids depends on groupings in their molecular complexes and the general conclusion is that Quinine is specific for the *malignant tertian* while Quinidine is best, so far tested, for the benign tertian.

Maj.-Gen. Hehir in praising Maj. Acton's paper, criticises some points. He finds benign tertian forms probably ***over 75*** % of cases met with and not 50%.—L. i./20,1382.

M. Nierenstein finds that if a 10% solution of Quinine Sulphate is heated 1 or 2 hours the solution turns dark and its specific rotation falls from —164 to —43° with formation of Quinotoxin probably. If the solution is heated, however, in the presence of Carbon Dioxide or Hydrogen the rotation alters from —164 to +58°. In this latter case the Quinine is perhaps partly isomerised to Quinidine.—L. i./20,1386.

Cinchona Febrifuge. Warning against deficiency in alkaloids or presence of harmful ones.—L. i./23,148.

Quinidina. $C_{20}H_{24}N_2O_2$=324·308.

When crystallised from Alcohol, the base contains 1 molecule Alcohol of crystallisation. The Alcohol is completely removable at 120° C. Quinidine free from water and Alcohol melts at 168° C. When crystallised from boiling water it contains $1\frac{1}{2}H_2O$.

Quinidine is soluble 1 in 2,200 in water, 1 in 750 boiling water, 1 in 30 Alcohol 90%, 1 in 20 Ether.

Its solution in Sulphuric Acid has a blue fluorescence, as in the case of Quinine, and it gives a similar Thalleioquin reaction. It differs from Quinine in M.Pt., and its Acid Tartrate and the Hydriodide are only slightly soluble.

Quinidinæ Sulphas. $(C_{20}H_{24}N_2O_2)_2.H_2SO_4+2H_2O$=782·724.

Dose.—5 to 10 grains (**0·3 to 0·6 Gm.**). Slipule No. 00 holds 6 grains. In treatment of auricular fibrillation an average is 6 grains (**0·4 Gm.**), thrice daily.

Occurs as needle crystals, ***soluble*** about 1 in 100 in water (according to our experiments).

Uses.—In addition to its efficacy in malaria, Quinidine, alone or in combination with Cinchonidine (*vide* Preparations *infra*) should be tried in all forms of fever, and wherever Quinine has been used hitherto, *e.g.*, in influenza, neuralgia, nervous headache, common catarrhs and as a general tonic.

Quinidine is believed to have specific effect in ***auricular fibrillation*** of the heart.

References to treatment of Auricular Fibrillation.

By FIBRILLATION is meant an incoordinated, tremulous and flickering movement of the muscular wall of the auricles, which is in a state of continual agitation. The fibrillating auricles might be compared with the weak fibrillary twitchings which occur in the muscles of the body when they are undergoing paralysis and atrophy. The fibrillations of the auricles may amount to as many as 500 a minute ; the ventricular rate may be 120, 140 or even 200 in rare cases. Many of the impulses fail to excite any ventricular contraction.

Tinct. Digitalis 10 minims every 4 hours or 15 minims every six hours should be given daily, carefully watching the effect by counting the pulse twice a day by auscultation. One should endeavour to find the daily quantity necessary to keep the heart about normal rate. Some patients feel best when the heart's rate is kept as low as 50.—C. H. Cattle, B.M.J. i./21,521. See also Oliver-Sharpey Lecture by Thomas Lewis.—*ibid.*, 551.

Auricular flutter associated with arrhythmia perpetua or delirium cordis treated by Quinidine. In one case 15·5 Gm. had to be given before the arrhythmia could be controlled. Usual dose to begin with, 0·3 Gm.—slowly increased. As much as 2 to 3 Gm. can be given in 24 hours.—B.M.J.E. i./21,85.

A study of 400 cases.—D. S. Brachman, L. i./21,374.

Quinidine Sulphate thought to have definite power to terminate paroxysms by restoring normal rhythm. The percentage of successful cases has varied up to 66%. A record of 13 cases. Dose 0·4 Gm. given in gelatin capsules, thrice daily. This amount found to be sufficient to ensure a progressive retardation of auricular rate for the first few days. Majority of successfully treated cases re-established normal mechanism. Quinidine has a remarkable action on the auricle and the action is of a potent nature.—A. N. Drury and C. C. Iliescu, B.M.J. ii./21,511–515.

Auricular fibrillation of itself not a dangerous or serious disease. Quinidine not free from danger.—J. Mackenzie, B.M.J. ii./21,576.

Return to normal cardiac rhythm in some cases. Its use is not without danger, the risk of embolism being a real one. Bibliography of the method. —A. W. M. Ellis and A. E. Clark-Kennedy, L. ii./21,894.

Many cases are well treated by Quinidine—others not.—B.M.J.E. ii./21,13.

Dose of 2 to 3 Gm. *p.d.* One patient died.—J. Hay, B.M.J. i./22,564.

Rhythm restored. Commence with moderately large dose—1·25 to 1·5 Gm. *p.d.* for 3 or 4 days. If beat becomes regular 1 Gm. *p.d.* for one or two weeks, then Digitalis and Quinidine alternately for 4 or 5 days.—B.M.J.E. ii./22,1.

Results with Quinidine were not encouraging in a few cases.—W. T. Richie, B.M.J. i./22,801.

Normal rhythm restored in a number of cases.—J. Hay and others, B.M.J. ii./22,1079.

Normal rhythm usually restored suddenly—sometimes without the patient being conscious of it. Small doses should be given.—B.M.J.E. ii./22,37,74.

In paroxysmal auricular fibrillation Quinidine Sulphate is indicated. In paroxysmal tachycardia it has little or no effect. In auricular flutter likely to prove of value. In a small proportion of cases with established auricular fibrillation Quinidine restores rhythm.—J. Parkinson and J. W. McK. Nicholl, L. ii. /22,1267.

Successful in use but not suited when there are extensive structural changes in the heart, especially if response to Digitalis is not good.—F. R. Fraser, B.M.J. i./23,507.

Small doses used : in no cases where large doses (48 or even 60 grains a day) were used were there any serious symptoms. The dosage of Frey—six grains is given the first day, two doses the second, three the third and so on till a maximum of 10 doses may be reached. This large number is, however, rarely necessary, as the majority of cases are restored on the second, third or fourth day. The dose is repeated every two hours starting at 5 a.m. Pulse recorded hourly.—J. G. Emmanuel, L. i./23,1050.

Successful circulatory efficiency induced in 50% of cases unaffected by usual therapeutic measures. 2 Gm. daily may be given without serious toxic symptoms.—C. S. Burwell and F. R. Dieuaide per Jl. Trop. Med., June 15/23, 223.

Quinidine Sulphate Slipules and Tablets. 5 grains (**0·3 Gm.**) and 6 grains (**0·4 Gm.**) are made.

Elixir Quinidine. *Martindale.*

Contains 10 grains (**0·6 Gm.**) per ½ ounce (**15 Cc.**) dose (*cf.* also **Elixir Quinidine-Cinchonidine**).

Quinidinæ Sulphas Acidus. $C_{20}H_{24}N_2O_2.H_2SO_4+4H_2O=494·448$.

Colourless crystals, ***soluble*** 1 in 8 in water.

Quinidinæ Hydrochloridum. $C_{20}H_{24}N_2O_2.HCl+H_2O=378·792$.

Colourless silky crystals, soluble 1 in 60 in water (according to our experiments).

Quinidinæ Hydrochloridum Acidum. $C_{20}H_{24}N_2O_2.2HCl+H_2O=415·260$.

Colourless crystals, soluble 1 in 4 in water (according to our experiments).

Sterules Quinidine Acid Hydrochloride.

5 grains (**0·3 Gm.**) in 75 minims (**5 Cc.**), also 10 grains (**0·6 Gm.**) in 150 minims (**10 Cc.**), for *intravenous* use, and 5 grains (**0·3 Gm.**) in 30 minims (**2 Cc.**) for *intramuscular* injection.

Quinidine compounds have been given intravenously in heart affections. This compound, by reason of its solubility, is suggested for intramuscular injection both in malaria and heart affections.

Quinidine Periodide. $C_{20}H_{24}O_2N_2.2I=578{\cdot}148$.

Dose.—1½ to 3 grains (**0·1 to 0·2 Gm.**), increased if necessary.

When made by the interaction of Quinidine and Iodine in suitable solvent (*cf.* Alkaloidal Periodides) this compound is obtained as an orange powder containing 56·1% Quinidine, according to investigations in the author's laboratories (1923).

Pharmacology :—

This Periodide is largely split up by Physiological Acid (39% of the Periodide being liberated), while a further 12·7% (of the Periodide) is rendered free by subsequent treatment with Physiological Alkali.

A 1½ grain dose was taken by one of the author's assistants (P.H.) with no noticeable effect. A 3 grain dose, however, caused free perspiration 4 to 5 hours after taking, together with feeling of cold.

Soluble in Chloroform, slightly soluble in Alcohol, almost insoluble in Ether, insoluble in water.

Uses.—This form of Quinidine may be of use for the treatment of auricular fibrillation of the heart, and it is well worthy of careful trial in benign tertian malarial infection, in comparison with the 'ordinary' Quinidine and Cinchonidine preparations.

Dispensing Note. To be given alone, in cachet or 'slipule,' preferably after food.

Cinchonidine. $C_{19}H_{22}N_2O=294{\cdot}287$.

Usually, in commerce, in small colourless leaflets, with M.pt. 202·5° C. ***Soluble*** about 1 in 4000 of water, and about 1 in 20 of Alcohol. It does not give the Thalleioquin reaction, and its solution in Sulphuric Acid is not fluorescent.

Cinchonidinæ Sulphas.—$(C_{19}H_{22}N_2O)_2H_2SO_4$, $3H_2O = 740{\cdot}698$. (From alcohol crystallises with $2H_2O$.). *Dose.*—1 to 10 grains. In silky white needles from mother liquor of Quinine Sulphate. ***Soluble*** 1 in 60 of Alcohol, 1 in 100 of water (more so with a little acid).

Uses.—Therapeutically, in malaria, this alkaloidal salt has been shown to have properties closely on a par with that of Quinidine. It has been used in the past in other forms of fever, and in neuralgia, and otherwise as Quinine.

Slipules and Tablets 5 grains each (**0·3 Gm.**) are made of this salt.

Elixir Cinchonidine. *Martindale.* Contains 10 grains (**0·6 Gm.**) per ½ ounce (**15 Cc.**) dose.

Elixir Quinidine-Cinchonidine. *Martindale.* Contains 5 grains of each per ½ ounce dose.

Cinchonidinæ Hydrochloridum. $C_{19}H_{22}N_2O.HCl+H_2O = 348{\cdot}771$.

Dose.—1 to 10 grains (**0·06 to 0·6 Gm.**).

Colourless crystals, soluble 1 in 30 in water.

Cinchonidinæ Hydrochloridum Acidum. $C_{19}H_{22}N_2O.2HCl + H_2O=385{\cdot}239$.

Dose.—1 to 10 grains (**0·06 to 0·6 Gm.**).

Crystals readily soluble in water.

Sterules for *intramuscular* injection, 7½ grains (**0·5 Gm.**) in 23 minims (**1·5 Cc.**).

Cinchonidine Periodide. $C_{19}H_{22}N_2O.4I = 801{\cdot}967$. (apparent composition).

Dose.—1½ to 3 grains (**0·1 to 0·2 Gm.**) increased.

When prepared by the interaction of Cinchonidine Base and Iodine in a suitable solvent (*cf.* Alkaloidal Periodides) this compound is obtained as a brownish-red powder, containing 36·7% Cinchonidine.

Pharmacology :—

According to our experiments it is not markedly split up either by Physiological Acid or subsequent treatment with Physiological Alkali, differing in this respect from both Quinine and Quinidine Periodide. It has been prepared in the writer's laboratories (1923).

A 1½ grain dose was taken by one of the author's assistants (M. H.) with no noticeable effect. A 3 grain dose, however, caused free perspiration 4 to 5 hours after taking, together with feeling of cold.

Solubility.—Slightly soluble in Chloroform ; almost insoluble in Alcohol and Ether. Insoluble in water.

Incompatible with alkalis, salts of metals and otherwise as alkaloids.

Uses.—The body may have a field of utility (*e.g.* in malarial infection) especially in cases where other ' Bark ' compounds have been found ineffective or badly tolerated. The content of Iodine (63·3%) renders it suitable for administration in conditions where Iodine is efficacious as an antiseptic. It may prove of service in influenza.

Dispensing Note. It is preferably given, finely powdered, alone in cachet or ' slipule ' (No. 1) after meals.

Cinchonidinæ Salicylas $C_{19}H_{22}N_2O.C_6H_4OH.COOH = 432{\cdot}37$. Is useful as a tonic and antiperiodic in neuralgia, rheumatism, sciatica, &c., 5 grains every 2 hours in Slipules (No. 00) or cachets.

Cinchonina. $C_{19}H_{22}N_2O = 294{\cdot}287$.

Dose.—1 to 10 grains.

Cinchonine salts are the cheapest of the alkaloidal salts of Cinchona. Their nauseous bitter taste is objectionable, though as prophylactics some have thought them superior to quinine.

Idiosyncrasy to Quinine. A lady had had 30 grains of the Bihydrochloride intramuscularly daily for three days, and subsequently 45 grains daily *per os*. This produced dermatitis. She could, however, take Cinchonine base, 16 grains a day.—W. Fletcher and E. A. O. Travers, B.M.J. i./23,629.

Cinchoninæ Hydrochloridum. $C_{19}H_{22}N_2O.HCl,2H_2O = 366{\cdot}787$.

Dose.—1 to 10 grains or more.

In white acicular crystals, soluble 1 in 30 of water and 1 in 2 of alcohol 85%. (Commercial samples we find vary).

Cinchonine Acid Hydrochloride. $C_{19}H_{22}N_2O.2HCl = 367{\cdot}223$.

Solution 1 in 2 by intramuscular injection—dose 7½, 10 or 15 grains—or the Acid Hydrobromide in malaria equal to or better than quinine.—Sir L. Rogers, B.M.J. ii./18,459.

Cinchoninæ Sulphas, U.S. $(C_{19}H_{22}N_2O)_2H_2SO_4,2H_2O = 722{\cdot}682$.

Dose.—1¼ to 10 grains or more.

In hard, colourless, short rhombic prisms with a vitreous lustre. Soluble 1 in 70 cold water, 1 in 10 alcohol 90%. Dilute solution in Dilute Sulphuric Acid should not be markedly fluorescent (absence of Quinine and Quinidine). The **Sulphocarbolate.** $C_{19}H_{22}.N_2O.C_6H_4.SO_3H.OH$ (?) = 468·425. In reddish white needles. Antiseptic febrifuge.

An examination of the polarimetric rotations of concentrated solutions of acid salts of the Cinchona alkaloids showed that when heated at 126° C. for 2 hours decomposition took place rapidly in the Bisulphate of Quinine, Quinidine, Cinchonidine and Cinchonine. The *Bi-hydrochlorides*, however, of Quinine and Quinidine were unchanged and of Cinchonidine and Cinchonine

only very slightly decomposed at the same temperature. The acid sulphates were completely altered by 4 hours heating at 141° C., whereas the corresponding hydrochlorides were effected to the extent of 0·4% in the case of Quinine, ranging to 7·7% with the Cinchonine.

Doubt is expressed as to the toxicity of Quinicine and Cinchonicine.—B. F. Howard and O. Chick, B.P. Conf. 1923; P.J. ii./23,92.

Quinetum. This name has been applied variously in the past. It should be used for the mixture of *amorphous* bases of Cinchona Bark, the crystallisable alkaloids having been previously removed.

QUININA.

Fr. Cx., P. Hung., P. Svec., U.S.

$C_{19}H_{20}N_2O.CH_3.OH + 3H_2O$ = 378·356 **Ph. Ned.** is anhydrous.

Dose.—1 to 4 grains (**0·06 to 0·25 Gm.**) or more (if anhydrous, 3 parts equal approximately 4 of sulphate). *Antimalarial Dose* (*U.S.*) *at least* 15 *grains daily.*

Quinine base can be produced with 1, 2 or 3 H_2O.

It forms additive compounds with Hydrocarbons, *e.g.*, 1 molecule Quinine +1 molecule C_6H_6. A body has also been made consisting of 2 molecules Quinine, 1 molecule Hydrocarbon and $2H_2O$. Combinations with Amyl Acetate, Ethyl Acetate, Toluol, Dimethylaniline and Nitrobenzol also with Essential Oils, *e.g.*, Lavender, Pine, Rosemary, also with Terebene, Terpineol have been made.—Schaefer, 8th Int. Cong. App. Chem., N.Y., Sept., 1912.

The most valued cinchona alkaloid, a bitter, white powder.

Quinine as an economic weapon.—Amongst all the Allies the call for Quinine was almost desperate—especially in the Italian Forces—in fact the allied cause was in jeopardy. It is scarcely too much to admit that the future destiny of the civilised world rested with the Dutch. The keynote of the situation was the Java Cinchona plantation. The famous War Agreement of September 3rd, 1918, saved the situation—the Associated Countries secured practically the whole year's production of Java Quinine on reasonable terms.—"X.F.O." C.D. '19,1065.

While the production of ***synthetic Quinine*** would undoubtedly be a triumph for organic chemistry, the more economic method of production will lie in the proper utilisation of the countless millions of natural laboratories that every Cinchona plant possesses in the cells of which its tissues are composed. A plea for an experimental Station.—Prof. Greenish, L.ii./22,236.

Extraction of Quinine and Strychnine from solutions of varying Hydrogen-ion concentration.—N. Evers, P.J. ii./22,90.

Quinine said to act better in treatment of malaria when given in an ***alkaline medium.*** Arguments have been brought forward to show that malaria is an acidosis—results of experiments.—Maj. J. A. Sinton, Jl. Trop. Med., April 2/23,116. *See also* 'Alkaloidal Notes.'

Soluble.—Slightly in water (1 in 2,600), 1 in 40 of ether and about 1 in 1 of alcohol 90%, also in dilute acids, 1 in 3 of chloroform, and in aqueous ammonia. Antipyrin increases its solubility in water. Its solution in diluted sulphuric acid is fluorescent, lævogyrate, and gives, with chlorine water and ammonia afterwards added, a green colour due to **Thalleioquin.**

Quinine is not so bitter as its salts, hence may well replace them.

Malaria in children is well treated with it. It is readily absorbed by the acid of the stomach, and quite as effective as the salts.—Jl. Trop. Med., Nov. 15/09,336.

It can be detected in the urine 10 minutes after taking.

In wasting diseases, *e.g.*, tuberculosis. Quinine retards protein breakdown and may be prescribed with advantage.—Pr. Jan., 1913.

Acidum Quinicum. *Syn.* KINIC ACID.

$C_6H_7.(OH)_4COOH+H_2O=210{\cdot}147$.

Dose.—4 to 8 grains (**0·25 to 0·5 Gm.**).

An acid contained in Cinchona, principally combined with the alkaloids and with calcium, forms white crystalline masses, soluble in water about 5 in 6, and in alcohol 90% 1 in 35. It is decomposed into hippuric acid in the system. This and **Lithium Quinate** in similar dose are used in gout and rheumatism.

℞ **Quininæ Arsenas.** $2(C_{20}H_{24}N_2O_2).\ H_3AsO_4+8H_2O = 934{\cdot}728$.

Dose.—$\frac{1}{8}$ to $\frac{1}{2}$ grain (**0·008 to 0·03** Gm.).

Small white crystals, sparingly soluble in water. It is an antiperiodic, given in chronic malarial fevers. Contains about 15·2% of arsenic acid, and 69·4% of Quinine.

Quininæ Camphoras.

$2(C_{20}H_{24}N_2O_2).C_8H_{14}(COOH)_2=848{\cdot}794$. *Dose.*—1 to 10 grains. An insoluble powder. 76·4% Quinine.

Quininæ Citras.

$2(C_{20}H_{24}N_2O_2).C_3H_4.OH(COOH)_3+7H_2O\ =\ 966{\cdot}822$.

Dose.—1 to 5 grains (**0·06 to 0·3 Gm.**).

Soluble 1 in 900, has, therefore, little taste. Given suspended in mixture. Contains 67·1% Quinine.

Effervescent Quinine Citrate. *Dose.*—1 drachm. Contains 1 grain.

Ferri et Quininæ Citras (*Off.*)

Dose.—5 to 10 grains (**0·3 to 0·6 Gm.**) in solution, or in pills with simple syrup or mucilage of acacia (not in excess, as, unless made very hard, they lose shape). Alcohol 60% with Glycerin 5% is also a suitable excipient. Contains about 15% of quinine, in greenish deliquescent scales. It has an agreeable bitter, chalybeate taste. Largely used as a general tonic.

Incompatible with Tannin and Alkalis, also with Phosphoric Acid (Ferric Phosphate may be thrown out), unless considerably diluted prior to mixing.

Flavoring.—Glyl Vanillæ, Glyl Menthæ Piperitæ (bold dose), Syrupus Zingiberis.

Effervescent Citrate of Iron and Quinine.

Dose.—1 drachm (**4 Gm.**) = 3 grains of the salt.

Tablets of Iron and Quinine Citrate 3 grains.

Syrupus Ferri et Quininæ Citratis.

Dose.—1 drachm (**4 Cc.**). 1 in 20 of Orange Syrup.

℞ **Ferri, Quininæ et Strychninæ Citras** (*q.v.*) contains 1% of Strychnine.

℗ **Sirop Neurotonique.**

Dose.—2 to 3 drachms (**8 to 12 Cc.**) in a little water after meals. Iron and Quinine Citrate 0·50, Strychnine Nitrate 0·01, Liquid Extract of Kola 5·0, Sodium Glycerophosphate 5·0. Dissolve with slight heat in Orange Syrup, *q.s.*, to 100.

Quininæ Formas Acidus ("**Neutral**" in France).

$C_{20}H_{24}N_2O_2.(H.COOH)_2=416{\cdot}35$.

Dose.—1 to 5 grains (**0·06 to 0·3 Gm.**).

Long white needles containing 77·9% Quinine, M.Pt. 95° C.

Quininæ Formas Neutralis ("**Basic**" in France). *Syn.* CHINOFORM, QUINOFORM. $C_{20}H_{24}N_2O_2.HCOOH=370{\cdot}329$.

Dose.—1 to 5 grains (**0·06 to 0·3 Gm.**). Subcutaneously 1 to 3 grains. (Stated not to be painful.)

Prepared by using a very small quantity of water, in which the Quinine is placed and the acid added. Crystals melting at 132°; lævorotatory. Contains 87·5% Quinine. A general tonic. Suitable for hypodermic use.

Solubility.—Varies according to conditions of manufacture. Some commercial samples we found were only soluble in 600 of water and 110 of Alcohol. We found that a 1 in 20 solution can be made extemporaneously by dissolving 1 gram of the base in 19 Cc. of water containing 0·125 gram of Formic Acid, but we could not make the salt more soluble than 1 in 55 of water and 1 in 7 of Alcohol, there being dissociation.

Sterules, Hypodermic, contain $\frac{1}{3}$ grain (**0·02 Gm**). and $\frac{3}{4}$ grain (**0·05 Gm.**).

Guttæ 1 in 50 have been employed satisfactorily in asthenopia.

Quininæ Hydrobromidum, U.S., FR. CX.—'Basic' Quinine Hydrobromide. P. HELV. **Quinine Bromide.**

$C_{20}H_{24}N_2O_2.HBr+H_2O=423{\cdot}252$.

Dose.—1 to 5 grains (**0·06 to 0·3 Gm.**) or more.

White acicular crystals, soluble 1 in water 40. (P. Helv. 60.)

Contains 76·6% of Quinine. Quinine is given with an excess of hydrobromic acid to lessen the cinchonism sometimes caused by large doses. Is valuable in acute rheumatism. In malaria for oral administration, hypodermically or intravenously.

Exophthalmic goitre has been well treated by 5 grain Capsules given to the limit of tolerance (3 or 4 Capsules *p.d.*)—for months or even years. In many cases the thyroids diminish in size—the exophthalmos seems to be the last to disappear—this may take years. The Quinine probably acts on the sympathetic system.—Boston Med. and Surg. Jl., Sept. 15,10 *per* Pres. Dec. 10,215.

In 2½ grain doses thrice daily one of the best treatments.—J.B. Alexander, Clin. Jl., Aug. 15/23,394.

Tablets contain 3 and 5 grains, also 3 grains, **with Phenacetin,** 5 grains.

Hypodermic Tablets of the Salt contain $\frac{1}{2}$ grain.

Tropical abscess has been treated by aspirating and injecting into the cavity 1% solution of this Salt.

Quininæ Hydrobromidum Acidum. (FR. CX.—'Neutral.')

$C_{20}H_{24}N_2O_2.2HBr+3H_2O=540{\cdot}222$.

Dose.—$\frac{1}{2}$ to 2 grains (**0·03 to 0·12 Gm.**) hypodermically.

In yellowish rectangular prismatic crystals, or in powder. Contain 60% of Quinine.

Soluble 1 in 7 of water, and is well adapted for hypodermic injection.

It is entirely unirritating. The additional hydrobromic radical tends to prevent quinism.

Sterules, Hypodermic, contain 2 grains (**0·12 Gm.**) each.

Injectio Quininæ Hydrobromidi Acidi Hypodermica. 1 grain in 6 minims. *Dose.*—3 to 12 minims (**0·2 to 0·8 Cc.**).

Used where quinine cannot be borne by the stomach. In malarial fever and subsequent rheumatism.

Quininæ Hydrochloridum. *Off.* Fr. Cx. 'Basic,' U.S., P. Helv., P. Jap., P. Hung. *Syn.* Quinine Hydrochlorate.

$C_{20}H_{24}N_2O_2.HCl+2H_2O=396{\cdot}808$.

Dose.—1 to 10 grains (**0·06 to 0·6 Gm.**). *Slipule* No. 0 holds 5 grains.

The crystals contain 81·7% base against 73½% in the sulphate.

Soluble 1 in 40 of water, 1 in 3 of 90% alcohol; 1 in 100 in normal saline.

Two salts with a common ion lessen each other's solubility. The slightly less solubility in Ringer's Solution (1 in 110) is due to its slight alkalinity, also to the fact that it contains a slightly greater number of Chlorine ions.—J. H. Crawford, B.M.J. i./22,874.

QuinineHydrochloride 2 with Antipyrin 1 will dissolve in 4 of water.

Uses and References—

It is sometimes better tolerated than the Sulphate. Subcutaneous or intravenous injections useful where not tolerated by the mouth. **Giemsa's Injection** contains Quinine Hydrochloride 10 Gm. Water 18 Cc., Ethyl-Urethane 5 Gm. The volume of product is 30 Cc., so that 0·5 Gm. is contained in 1·5 Cc. of solution for injection.

As a fever prophylactic quinine hydrochloride 3 grains with phenacetin 5 grains is largely used in Portugal.—Ph. Notes.

For the paroxysmal headache or neuralgia so common after malaria the following mixture is recommended:—Quinine Hydrochloride 3 grains, Tincture of Cimicifuga 5 minims, Citrate of Caffeine 2 grains, Spirit of Chloroform 10 minims, Compound Infusion of Orange to 1 ounce, twice daily. *V.* also the Acid Hydrochloride.

In acute tonsillitis, Quinine internally and as mouth-wash useful; also with Dilute Nitric Acid in cachectic cases of vesicular stomatitis.

Wounds treated by Quinine Hydrochloride 1% solution as wet dressing, also 1/10% with 1/10% of Hydrochloric Acid as continuous drip. Active in ridding heavily contaminated wounds of the gas bacillus. Quinine is especially effectual in a menstruum of pus.—K. Taylor, B.M.J. ii./15,923; L. i./17,294.

Anal fissure treated by Quinine Hydrochloride packing (5 grains) and Quinine suppository. Granulation good.—H. G Leyton, B.M.J. i./18,314.

Mistura Quininæ cum Ferro.

Dose.—½ ounce thrice daily in water 30 minutes after food.

Quinine Hydrochloride 30 grains, Tincture of Ferric Chloride ½ ounce, Glycerin 1 ounce, Water to 8 ounces.

Bad cases of secondary syphillis do well on this.

Lotio Quininæ Hydrochloridi R.O.H. 1%. For corneal ulcers *cf.* p. 720.

Pessus Quininæ.—3 to 5 grains of Quinine Hydrochloride. A valuable remedy for leucorrhœa.

Tablets, 1, 2, 3, 4, and 5 grains.

Vaginal Suppositories (flat shape) containing 5 grains Quinine Hydrochloride have been prepared *without glycerin*, using a basis of Gelatin 1, Water 9. They should prove less irritating. A solution of Quinine arrests the movement of spermatozoa.

Contraceptives. 1% Lactic Acid Solution, or Vinegar 1 drachm to the pint, or Permanganate 1 in 4000 in Normal Saline said to be useful as douches. Sterilisation of men and women described, also Dutch ring pessary—said to give little inconvenience.—Birth Control Conference, L. ii./22,195.

We found in a tablet for local use, the subject of a patent, 0·5 Gm. of **Rochelle Salt** and 0·5 Gm. of Starch.

Schereschewsky's 40% Quinine Ointment holds a high position for disinfection against venereal disease in Germany. 1 in 1000 Perchloride is reliable.—L. i./22,292.

Uganda, Malaria in. Routine treatment Quinine Hydrochloride, *per os*, sometimes intramuscularly in addition.—J. A. Taylor, B.M.J. i./20,113.

MALARIA TREATMENT. Give small dose of Calomel (1 grain), repeated each night. Give the Quinine (Hydrochloride) in 3 or 4 grain doses, *before* meals and at bed-time, with 3 or 4 ounces of water. Continue for two months.—T. Stone Dixon, B.M.J. i./23,1087.

Quinine Hydrochloride, 39 grains in a malaria patient, caused severe vomiting, deafness and dilation of pupils. Total blindness for 7 weeks, after which for 2 months vision was restored, after which permanent blindness supervened. Possibly due to the effects of Alcohol and tobacco on the nerve fibres and ganglion cells.—J. S. Du Toit, per T.D.B. 19/22,710.

For further information cf. Quinine Acid Hydrochloride (infra) and Quinine Sulphate, etc.

Tinctura Quininæ (*Off.*). *Dose.*—½ to 1 drachm (**2 to 4 Cc.**).

Quinine Hydrochloride 1, Tincture of Fresh Orange 50. A very agreeable form of taking small doses of Quinine. Hydrochloride of Quinine is used as first suggested by W. Whitfield.

Vinum Quininæ (*Off.*). *Dose.*—½ to 1 ounce (**15 to 30 Cc.**).

Contains one grain of Quinine Hydrochloride dissolved in one ounce of Orange Wine.

The Board of Customs and Excise allow its sale without Excise licence if:—(a) It is prepared in accordance with the Off. directions. (b) That sales are made only by duly qualified chemists and druggists; and (c) It is labelled to show that it is to be used as a medicine. The word "Dose" should appear on the label in bold type.

This should not exceed the Off. dose—viz., ½ to 1 oz.—but the Board do not object to the use instead of the words "one or two tablespoonsful," or "half a wineglassful."

To estimate approximately add dilute Sulphuric Acid ½ drachm to Quinine Wine ½ ounce, then Mayer's Reagent (*q.v. Vol. II.*) 2 drachms or *q.s.* Collect, wash and dry the precipitate, which should weigh 1½ grains.—P.J. ii./05,901.

Quininæ Hydrochloridum Acidum. In FR. CX. is termed 'Neutral' Quinine Hydrochloride. $C_{20}H_{24}N_2O_2.2HCl=397{\cdot}244$.

Dose.—1 to 10 grains (**0·06 to 0·6 Gm.**), *Antimalarial dose* (*U.S.*) *at least* 15 *grains daily.* ½ to 2 grains (**0·03 to 0·12 Gm.**) hypodermically.

In white or yellowish white crystalline crusts. *Off.* states in amorphous powder. Is claimed to be soluble 1 in 1 of water. Contains 81·6% of quinine. It is the ***best salt for making injections*** which have to be sterilised (*cf.* Bi-Sulphate). 1 grain in 6 minims is suitable for hypodermic use, *e.g.*, in malaria, also internally, as prophylactic against. The hydrochloric radical is not as irritating as the sulphuric to the stomach.

N.B.—FR. CX. adopts the salt + 2½ H_2O. Crystallised from alcohol it is more or less charged with water. The Salt contains alcohol and water of crystallisation. Left exposed to the air this loses its alcohol and the Salt changes in to one with 2½ molecules of water, becoming at the same time opaque.

LIVER ABSCESS.—After exploratory aspiration repeated irrigation of an abscess cavity with Quinine Bihydrochloride 3 to 5 grains per ounce may render subsequent operation unnecessary.

Malarial Relapses.—An Investigation of Treatment under direction of Sir Ronald Ross.

The best for old cases was a system carried out by M. Harrison. It was used on 49 chronic cases, mostly of benign tertian. Only 10·2% relapsed. Fever was reduced in 12 to 24 hours, and no asexual parasites could be found after 48 hours.

Patient to remain in bed 12 days (this period may be reduced) and to receive intramuscularly in each deltoid muscle 15 grains of bi-hydrochloride daily with 10 grains of Quinine Hydrochloride in Mixture No. 1 (*infra*) thrice daily, totalling 60 grains of Quinine daily for the 12 days. Patient is then allowed up and receives for three days Mixture No. 2 four times a day (60 grains of Quinine daily by the mouth). Patient is then put on Mixture No. 3 four times daily for 14 days (20 grains of Quinine daily). Light work allowed.

Anticachexia Mixture No. 1. For a dose after food:—

Quinine Hydrochloride 10 grains, Tincture of Ferric Chloride 5 minims, Solution of Strychnine Hydrochloride 5 minims, Hydrochloric Solution of Arsenic 5 minims, Dilute Nitro-Hydrochloric Acid 5 minims, Magnesium Sulphate ½ drachm, Syrup of Tolu ½ drachm, Glycerin 10 minims, Water to 1 ounce.

Anticachexia Mixture No. 2.

As No. 1, but *add* Quinine Hydrochloride 5 grains and Dilute Nitro-Hydrochloric Acid 5 minims to the dose.

Anticachexia Mixture No. 3.

As No. 1, but *reduce* the Quinine Hydrochloride 5 grains and Dilute Nitro-Hydrochloric Acid 5 minims in each dose.—B.M.J. i./18,428.

Malaria. Eight grains daily, or more, sufficed almost invariably to improve cases greatly while being taken, but failed to cure them completely even after 6 weeks' administration or more. What is the explanation? According to theory elaborated by Sir R. Ross and D. Thomson parasites continue to breed in the blood by the known method from the moment of infection until the last of them has died out. The number of parasites in high fever runs from 5000 to 300,000 per cub. mm. of blood. Even if there were originally 1 parasite per cub. mm. it would mean 3,000,000 in the body. Unfavorable climate, fatigue, etc., tend to precipitate relapses in malaria. While the infection continues there is a constant struggle with varying fortune between the invaders and the opposing forces. Patient's blood would take as much exception to a sudden large dose of a drug as to the parasites themselves. Parasites in the blood are not fish in a bowl which can be stirred up and killed. According to Lipkin, Quinine is concentrated in the suprarenals, kidneys and spleen; cast out quickly from the lymphatic glands and the blood; and destroyed by the liver and muscles. Large numbers of the plasmodia are hence likely to escape any dose we can give. The *last* plasmodium must be destroyed. Anything under 60 grains a week appears useless in the large majority of cases and anything over 15 grains daily seems only to be required when there is fever, and say, for a week or fortnight afterwards, followed by 10 or 15 grains daily for months. *Ten grains daily carried out rigorously for 3 months (84 days) is sufficient in the majority of cases.*—Sir Ronald Ross, B.M.J. ii./21,1 *et seq.*

(This abstract is placed here to follow the Investigation on Relapses by the same author. Sir Ronald Ross purposely refrains from dealing with the virtues of the various Quinine Salts.)

ACTION OF QUININE IN MALARIA. The action of Quinine in malaria is probably to narcotise the extra-cellular parasites and paralyse their movements without having much effect on the leucocytes, and to aid the immune reactions on intracellular parasites.—Sebastian L. Rodrigues, "The Antiseptic," Madras, Dec./22.

It was found in a case of idiosyncrasy that **Cinchonine** base was better tolerated than Quinine Acid Hydrochloride *vide* p. 708.

QUININE HÆMOGLOBINURIA occurs in people suffering from chronic malarial cachexia induced by several attacks of malaria, for which Quinine in small, irregular and insufficient doses has been taken. Disease precipitated by taking comparatively large doses of Quinine during an attack of fever. Recovery after stopping all Quinine until hæmoglobinuria disappears, and then giving the drug (bihydrochloride) in small and increasing doses preceded by Calcium Lactate.—N. Cantlie, Jl. Trop. Med., Feb. 1/23,40.

Intravenous Injection of Quinine Acid Hydrochloride.

The evidence from experience is that this salt is the best for the purpose. Chemically it permits of adequate sterilisation in solution and is in other respects permanent.

Dose.—An average dose may be considered as from 4 to 15 grains (**0·25 to 1 Gm.**) though Sir L. Rogers, B.M.J. ii./17,381, states that 5 to 7½ grains commonly produces cinchonism.

Dilution.—Some use an exceedingly dilute solution (*e.g.* as low as 1 in 300). Others advise even a 10% solution. Personally we recommend a medium of 1 in 40 or 1 in 50. Newton Pitt uses 4 grains (**0·25 Gm.**) in 150 minims (**10 Cc.**) *i.e.* 1 in 40. A. G. Phear found 10 grains in 300 minims (**20 Cc.**) saved many lives in Macedonia.

Rate of injection.—This, as with all intravenous procedure, should be slowly performed.

DANGER OF RAPID INTRAVENOUS INJECTION of Quinine solution in malaria. There may be dangerous fall of blood pressure with concentrated solution. The whole problem turns on the amount of Quinine passing through the heart every second. The amount of Quinine injected into a vein at the bend of the elbow should not be more than 1/120th grain per second or ½ grain a minute. This will mean 10 grains will require 20 minutes. For Quinine Hydrochloride intravenous injection the solution should not exceed strength of 1 in 300—to be given at the rate of 10 Cc. per minute for patients over 15 years of age. Half rate for children under 15. Tables showing effect on systolic, diastolic and pulse pressures after intravenous injections of dilute solutions of Quinine Bihydrochloride.—U. N. Brahmachari, I. ii./22,175, Jl. Trop. Med., July 1/22,209-211.

Malaria is not more readily cured by intravenous medication. 90% of the Quinine injected intravenously disappears from the blood within one minute and is *stored in the tissues.* Intravenous medication will always have a more or less restricted field of usefulness. —B.M.J.E. ii./22,33.

MALARIA IN MACEDONIA.—The first essential was found to be an initial dose of calomel, followed if necessary by a saline aperient. Moderate cases received Quinine Sulphate 45 grains (the supplies of Hydrochloride being short) divided into 3 equal doses, for at least 3 days and longer if pyrexia persisted. 30 grain doses then continued. In more severe cases 60 grains *p.d. per os* were given or in part intramuscularly. In cases of persistent vomiting or marked digestive disturbance oral quinine is either rejected or remains largely un-

absorbed, and the advantages of the intramuscular method are very great. It was found convenient in these cases to give two intramuscular injections, each of 20 grains, one in the morning, the other in the evening, supplemented by 20 grains of the bihydrochloride by mouth in the course of the day. As soon as the severer symptoms were under control oral administration of quinine was resumed. On the earliest appearance of cerebral symptoms ***10 grains of the Acid Hydrochloride*** intravenously in ***20 Cc. of diluent*** saved many lives.—A. G. Phear, L. i./20,195.

There is no decisive experimental proof of the superiority of injections of Quinine.—Sir R. Ross, B.M.J., 1./20,130.

Observations on the treatment of 1314 cases of malaria by the intravenous injection of Quinine.—Capt. N. Cantlie and El Sach Yusef Effendi Moubarak, Jl. Trop. Med., Feb. 15/24,38.

Quinine in malaria given orally as efficacious as by injection in prevention of relapses. Where oral administration is contraindicated intramuscular injection is simple and safe, but not recommended as routine treatment.—R. N. Chopra, per Jl. Trop. Med., Feb. 15/23,69.

Absorption and Excretion of Quinine.—(See also expts. by M. Nierenstein, B.M.J. i./18,428).

"Most of the Quinine admitted by the mouth is, under ordinary circumstances, absorbed from the small intestine; a slight amount from the stomach, especially if administered while fasting and in the form of an easily soluble salt in water; a relatively smaller amount by the large intestine. Affections of the gastro-intestinal tract and liver influence the amount absorbed, as also do the food contents and degree of solubility of the salt given. Absorption is retarded if Quinine is given with, or soon after, food, also when the less soluble salts are employed. Rapid and energetic absorption is best obtained by giving a soluble salt during fasting; gradual and prolonged absorption by administering a less soluble salt with, or soon after, meals; under such conditions absorption is maintained at a considerable level for about eight hours Thus, when sporulation is regular, a soluble salt should be given during fasting, two or three hours before the paroxsym; in other cases one of the less soluble salts should be given with, or soon after, meals, every eight hours. Captain MacGilchrist also regards *Quinine Salts as fundamentally unsuited for hypodermic use*, and therefore considers this method should be entirely *abandoned*. In intravenous injections great dilution, 1 in at least 150, is necessary to avoid the dangers special to Quinine. *Seven grains of Quinine Bi-hydrochloride should be dissolved in from two to three pints of saline solution.* This method is called for in cases of emergency. When there is a tendency to hæmoglobinuria, the Quinine Alkaloid, instead of one of its salts, should be used. Rectal injections, Captain MacGilchrist considers irritating, and of little value, and suppositories of Quinine are useless in malaria."—L. i./11,1221.

See also Quinidine 703 *et seq*, *Quinine Sulphate, p.* 720, *Ac. Sulph.* 727 *and Quinoidine* 729.

As local anæsthetic ½ to 1% solution (for mucous membrane a 10% solution may be applied with cotton wool) is injected into the tissue. A coagulable exudation forms, beginning a few minutes after the injection and becoming complete after 24 to 48 hours. If incision is made at once after injection, the anæsthesia is short, and the wound heals as if no local anæsthetic had been used. When primary union is not possible, and more prolonged anæsthesia is wished for, the tissues should not be incised until the infiltration has formed, *e.g.* after half an hour or more; when this infiltration has occurred the anæsthesia may last several days.—L. ii./10,840.

Soluté de Quinine pour injection hypodermique.—Fr. Cx.
Quinine Acid Hydrochloride 3 Gm., Antipyrin 2 Gm., Water to 10 Cc. Special instructions as to sterilisation are provided, *q.v.*

Isotonic Quinine Acid Hydrochloride Solution contains 0·565 Gm. in 10 Cc.—P.J. i./12,357.

Sterules, Hypodermic, contain 2 grains (**0·12 Gm.**) also 3 grains (**0·2 Gm.**), 5 grains (**0·3 Gm.**) also 15 grains (**1 Gm.**) in 2 Cc. for ***Malaria*** also 4 grains (**0·25 Gm.**) in 10 Cc. and 10 grains (**0·6 Gm.**) in 20 Cc. for ***intravenous uses.***

Also **Sterules, Hypodermic of Quinine Acid Hydrochloride** 5 grains (**0·3 Gm.**) with **Antipyrin** 3 grains (**0·2 Gm.**).

Tablets 1, and 5 grains. **Tablets, Hypodermic,** 1, 2, and 3 grains.

Quininæ Hydrochloro-Carbamidum.—*Syn.* UREA-QUININE. (A variety ✱**Nikalgin** (T.M. 366289.)—B.M.J. i./18,254.).

$C_{20}H_{24}N_2.O_2.HCl\ CO(NH_2)_2,HCl+5H_2O=547{\cdot}377.$

Dose.—5 to 15 grains (**0·3 to 1 Gm.**).

In small prisms, soluble 1 in about 1 of water. Contains 59·2% Quinine. Used hypodermically in malaria 2 to 5 grains and in cholera, in as large as 12 to 15-grain doses.

As local anæsthetic analgesia persists for 4 to 6 hours, even to several days. Used in America for malaria in which marked anæsthesia was noticed at the site of injection, hence its trial as a Cocaine substitute. 3 to 5 Cc. hypodermically of 1% solution (up to 3% is harmless). In 10 to 30 minutes produces anæsthesia; at the same time it acts as a hæmostatic. Healing of wounds is, however, delayed owing to thickening of the edges due to fibrinous exudation. In operations on hæmorrhoids 2% solution has caused sloughing.

J. E. D. Jones writes us 5 Cc. of 1% solution injected to ease pain in a case of spinal injury. Anæsthesia was prompt and profound and lasted 2 days without ill effect afterwards—far superior to Cocaine and Morphine.—A godsend.

In tonsilitis and in tuberculosis of the larynx 10% solution or less is suitable,—even 20 or 50% may be used. Apply by spray, sponge, brush, etc. A teaspoonful or so of solution may be taken in the mouth and used to bathe the tonsils by swaying the head from side to side.

Hæmorrhoids injected with Quinine Urea Hydrochloride 5 to 10% solution. Enemata of Sodium Bicarbonate used for washing out the bowel instead of soap in U.S.A.—non-irritating.—L. J. Hirschman, B.M.J. ii./21,155.

Painless operations. Results with Quinine Urea Hydrochloride and with Novocain.—P. Lockhart-Mummery, Pr., Feb. 1920.

From point of view of acidity no advantage in this salt over hydrochloride. —J. H. Crawford, B.M.J. i./22,874.

Sterules contain 3 and 5 Cc. of 1% solution for subcutaneous use.

Sterules of Urea-Quinine with Eucaine ¼ grain each for dental use are prepared.

Suppositories contain 5 grains for use in painful hæmorrhoids. **Ointment** (with Lanolin and Soft Paraffin basis) 20%.

Quininæ Hydriodidum. *Syn.* QUININE IODIDE. $C_{20}H_{24}N_2O_2,HI=452{\cdot}236$. Is in minute pale-primrose coloured, slightly soluble crystals. **Quininæ Hydriodidum Acidum.** *Syn.* QUININÆ IODIDUM ACIDUM. $C_{20}H_{24}N_2O_2 2HI,5H_2O=670{\cdot}244$. Is in golden crystals, soluble about 1 in 20 of water. Contains 48·4% Quinine. Must be kept from the light. **Quininæ Hypophosphis.** $C_{20}H_{24}N_2O_2$, $H_3PO_2.2H_2O=426{\cdot}408$. In crystals or powder. Soluble 1 in 35 in water, or even less if pure.—D. B. Dott, P.J. i./22,64,87. More soluble in alcohol 90%. Contains 83·1% Quinine.

Quininæ Lactas, Quinine Lactate.

$C_{20}H_{24}N_2O_2.CH_3.CHOH.COOH=414{\cdot}371$.

A granular white powder, soluble 1 in 10 of water; said to be well tolerated. Contains 78·3% of quinine. Suitable for hypodermic injection. For gonorrhœa, 1% solution forms an excellent injection.

Dose of each of the above.—1 to 5 grains (**0·06 to 0·3 Gm.**) or more.

Quininæ Nucleinas. *Dose.*—1 to 5 grains (**0·06 to 0·3 Gm.**).

Yellowish powder containing 60% quinine and 40% nucleinic acid. In-

soluble in water. In syphilis has been employed as 5% suspension in Olive Oil. Intramuscular injections of 10 Cc. were used, assisted by intravenous injections of the hydrochloride.

See also Quinine Hydrochloride, and compare Quinine Urethane.

Quinine Periodide. $C_{20}H_{24}N_2O_2.3I=705{\cdot}068$ (apparent composition).

Dose.—1½ to 3 grains (**0·1 to 0·2 Gm.**) (in Slipule No. 5).

When made by interaction of Quinine and Iodine in suitable solvent (*cf.* Alkaloidal Periodides) this compound is obtained as a dark-red powder containing 46% of Quinine, according to investigations in the author's laboratory (1923).

Pharmacology.—

This Periodide is almost completely resistant to Physiological Acid, only 1·6% of the Periodide being liberated, while on the other hand a large proportion (9·3% of the Periodide) is liberated in Physiological Alkali.

Doses of 1½ and 3 grains were taken by one of the author's assistants (V. W.). No discomfort was caused, and no untoward symptoms observed.

Soluble slightly in Alcohol, almost insoluble in Chloroform and Ether, insoluble in water.

Uses.—In all forms of fever. It is specially recommended in influenza, the combined effect of Quinine and Iodine in a relatively free condition suggests the compound is veritably a specific combination. In general it is a tonic. In malaria it should be submitted to an extended trial. Many persons do not tolerate the ordinary forms of Quinine. The sulphate may be dissociated with liberation of free Sulphuric Acid, causing irritation. The hydrochloride was supposed to overcome this difficulty, apparently without success, and one frequently reads of Quinine base (Cinchonine base has also been specifically advised) being given to circumvent the difficulty in question. Might be of service in a dysentery associated with malaria. There is no doubt that a compound containing so large a proportion of Quinine, which passes through the stomach without causing discomfort, is worthy of careful investigation.

Dispensing Note.—To be given alone, in cachet or 'slipule,' preferably after meals.

Quininæ Phosphas.

$2[C_{20}H_{24}N_2O_2]$, $H_3PO_4+8H_2O=890{\cdot}808$.

Dose.—1 to 6 grains (**0·06 to 0·4 Gm.**). Is in acicular crystals like the sulphate, but harder and denser. Contains 72·8% quinine Composition varies with manufacturers. Soluble 1 in 420 of water.

Quininæ Quinas.—$C_{20}H_{24}N_2O_2.C_7H_{12}O_6+2H_2O=552{\cdot}471$.

Dose.—1 to 10 grains (**0·06 to 0·6 Gm.**).

A combination of Quinine with an acid already existing in the bark; possible advantages.—P.J. i./13,401. *Solubility* we find 1 in 7. Suitable for injection.

Quininæ Salicylas.

$C_{20}H_{24}N_2O_2.C_6H_4(OH)COOH + H_2O$ (U.S.) = 480·407.

Dose.—2 to 6 grains (**0·12 to 0·4 Gm.**).

White crystals, sparingly soluble in water, and about 1 in 60 of alcohol 90%.

Incompatible with mineral acids—salicylic acid may crystallise out. Contains 68·8% of quinine. Should be given suspended in

water, or in cachets, or pills with syrup of glucose; recommended for diarrhœa and neuralgia, rheumatism and sciatica.

In rheumatic fever virtually inert; cases treated with 10 to 15 grains six hourly.—R. Stockman, B.M.J. i./13,599.

Effervescent Quinine Salicylate

Dose.—1 drachm. Contains 3 grains in 1 drachm.

Used in the tropics as a prophylactic to malaria.

Tablets 3 grains (**0·2 Gm.**). *Dose.*—1 to 2.

Capsules contain 5 grains (**0·3 Gm.**).

In dengue Quinine Salicylate 5 grains every four hours has proved useful.—Brooke.

Quininæ Acetyl-Salicylas.

$C_{20}H_{24}N_2O_2.CH_3.COOC_6H_4COOH = 504{\cdot}417$.

Dose.—1 to 5 grains (**0·06 to 0·3 Gm.**).

Useful antipyretic and antiseptic compound. Contains 64·3% Quinine. Melting at 167° C. ***Soluble*** in Water 33, Alcohol 1 in 40, Chloroform 1 in 10. Immediately decomposed by Acids and Alkalis. Tablets, 3 grains are prepared.

Quinine Acetosalicylsulphate. $(C_{20}H_{24}N_2O_2)_2.H_2SO_4.4C_9H_8O_4.4H_2O = 1539{\cdot}192$.

This substance appears to be a definite compound, soluble 1 in 50, *i.e.*, much more soluble than the components, hence should be of use therapeutically.—D. B. Dott, C. & D., Mar. 26, 1921, p. 429.

Quininæ Sulphas, Quinine Sulphate (Termed **'Basic' Quinine Sulphate** in Fr. Cx. and **F.E.**).

$(C_{20}H_{24}N_2O_2)_2.H_2SO_4 + 7H_2O = 872{\cdot}804$. Fr. Cx. and P. Jap. give $8H_2O$. *Off.* $7\frac{1}{2}H_2O$.

This is the principal quinine salt, it contains 73·5% (*Off.* formula).

Dose.—1 to 5 grains (**0·06 to 0·3 Gm.**), tonic; 5 to 15 grains (**0·3 to 1 Gm.**), antiperiodic. Slipule No. 0 holds 5 grains.

White bitter crystals. ***Soluble*** 1 in 800 of cold water, 1 in about 100 of 90% alcohol, 1 in 40 of glycerin. It is rendered more soluble by the addition of Antipyrin.

Over Dose.—100 grains of Quinine Sulphate taken in one dose in error. Hot infusion of coffee gave great relief and holding hands in *hot* water. Temporary deafness was caused.—E. T. Jones, L. i./14,277.

Quinine Blindness caused by 20 Gm. Stomach lavage, enemata, etc. Central vision reappeared after 15 days, but peripheral vision and vision for colours returned more slowly.—Pres., Jan., 1913,203.

Testing of.—The French Codex method of testing Quinine Sulphate is better than that given by other pharmacopœias.

It is prescribed in pill, cachet, slipule, tablet or mixture—if in mixture 1 minim of Dilute Sulphuric Acid to the grain of salt will render more soluble (with fluorescence). For pills 1 drop of strong Sulphuric Acid as excipient for 5 grains.

Incompatible with alkalis and alkaline carbonates, also incompatible with Liquor Ammonii Acetatis (unless distinctly acid in reaction), iodides, and astringent infusions containing tannin. The addition of a small proportion of sodium hypophosphite may overcome the incompatibility with potassium iodide—*i.e.*, the formation

of herapathite (quinine iodosulphate).—To prevent coagulation of the precipitate when prescribed with alkalis, mucilage of acacia should be ordered. With Phenol in a pill may liquefy.

The heating of Aqueous Solutions of Quinine and Cinchonine Salts to boiling point (98 to 102° C.) is stated to convert the alkaloids into toxic isomers. Long exposure to sunlight is said to do the same.—C.D. ii./12,475.

Flavoring—Glyl Vanillæ, Glyl Menthæ Piperitæ (bold doses); Syrupus Aurantii.

Uses.—For all forms of fevers, and as prophylactic; wards off remittent fever. For neuralgia and nervous headache; it combats whooping cough, influenza (Ammoniated Tincture) and hay fever. It increases uterine action, and is the most used tonic drug; antiseptic in typhoid, phthisis and pneumonia. Pills of Quinine, Atropine, and Arsenic (*q.v.*) will frequently stop the development of a "cold." If Quinine deafness occurs, or for large doses, hydrobromic acid should be used. In labyrinthine disorders, it is very uncertain—often intensifying the symptoms. May be administered by Iontophoresis.

Quinine affects metabolism. The total solids excreted by the urine may drop 40% within 24 hours after a single dose.

Slipules contain 1, 2, 3, and 5 grains.

Diphtheritic ophthalmia and all cases of infective and sloughing ulcers of the cornea. Quinine Hydrochloride or Sulphate locally applied is useful.—Sir John Tweedy, B.M.J. i./16,11. 1% solution of sulphate with dilute sulphuric acid *q.s.* employed.—L. i./05,360.

Klein discovered that quinine is excreted (and therefore presumably absorbed) more slowly when given hypodermically than when given *per os*. In malaria it is a good plan to give both *per os* and hypodermically simultaneously, so that if rejected by the stomach there will be no loss of time. Children bear quinine well. A child of ten will tolerate an adult dose, a child of five will take 5 grains twice daily, and a child of one year will take 3 grains twice daily without risk. Quinine should be kept up in full doses for about a fortnight after the fever has ceased, and then continued in doses of 10 grains twice daily on two consecutive days in each week. If the drug is stopped, even after two or three weeks of thorough treatment, relapses are the rule, and it is generally only after the occurrence of the relapse that the average hospital patient begins to take seriously the advice to continue the use of the quinine.

Experience in Treatment of Malaria during the War.

Every case of malaria (treatment advised for United Kingdom) to receive 60 grains of quinine every week until the patient has been free from malaria fever for at least 60 days.—R.A.M.C. Journal, Sept. 17, B.M.J. ii./17,699.

Always give Calomel first. Quinine always in solution with a little Sulphuric Acid. Wait until a high temperature has subsided before giving. Never give it on an empty stomach, and in many cases give a little alcohol after.—E. Yeates, B.M.J. ii./17,878; i./18,603.

Intramuscular injections of big doses of Quinine dangerous.—C. A. Johnston, B.M.J. i./18,586.

In India after proving a case to be malaria by examining a smear as much as 30 grains is given in a bad case. This causes bad headache, but clears up the attack in a short time, barring a relapse. The soldiers themselves, having been given a five grain pill, provide themselves (when they can manage it) with *five more pills*, and take the six together!—R. E. P.

Malaria in the Salonica Army. Quinine *per os* found preferable to intravenous use—give a salt which dissolves slowly, *e.g.* the sulphate. Investigation by estimating with Tanret's Reagent the amount of quinine excreted shows that the intravenous method produces the shortest stay of quinine in the system. Intramuscularly in oil gives the *longest* retention. Arrhenal 0·2 to 0·3 Gm. to be injected on two successive days, alternating with two days of treatment with 2 Gm. of Quinine.—L. ii./17,358.

Subtertian Cerebral Malaria treated with Quinine and Galyl—the quinine *per os* (20 grains thrice daily) and intravenously (0·8 Gm.) over a period of time and the galyl (0·2 Gm. to 0·4 Gm.) subsequently intravenously.—A. W. Falconer and A. G. Anderson, L. ii./17,486.

Recent Advice on Treatment.

(Referring mainly to Quinine Sulphate)

The medical profession is to blame for spreading the superstition that Quinine could prevent or cure malaria. 80% of the men who went to Salonika contracted malaria. Each case costs the taxpayer £1,000 for treatment. The cost of malarial disease incurred during the war was 50 millions a year, all due to the mid-Victorian superstition. The consensus of the discussion (B.M.A. Cambridge meeting) was that *Quinine had failed.*—Abst. C.D. '20,966.

To cure malaria one must act quickly and drastically. Once the relapsing stage supervenes nature and time alone will bring about the desired result, though Quinine may assist.—R. U. Moffatt, B.M.J. i./20,60.

Hydropathic treatment of malaria better than Quinine.—T. Zangger, L. i./20,766.

Effect of Quinine in precipitating labour. In the tropics it is frequent to be called upon to treat an attack of malaria in a pregnant patient. Experiments showed that Quinine in certain concentrations causes contraction of both the longitudinal and circular fibres of the uterus. 1 in 300,000 has no effect. 1 in 44,000 produces a tonic spasm which, if sustained, would cause asphyxia of the fœtus from constrictions of the placental sinus. This concentration could only occur if the patient was nearly poisoned with Quinine.

Therapeutically, as soon as malaria is diagnosed, which is a matter of urgency in pregnancy, give Quinine or Quinidine at once. Divide dosage into 2½ or 5 grain doses every 2 or 4 hours.—H. W. Acton, L. i./21,216.

The **International Health Board U.S.A.** made a vast malarial survey in one of the counties of the State of Mississippi. Over 30,000 people were examined and the conclusion was that Quinine will cure all cases of malarial fever if it is given in the right doses for a sufficiently long period. Based on these results, the National Malarial Committee of the U.S. Public Health Service adopted what is known as the standard treatment for malaria in the U.S.A. In malarial districts officials in the U.S. conduct active propaganda in their localities to inform the public, and it is thought that, in a few years, a large diminution in malaria may be effected. In the leaflet on the **Standard Treatment** it is stated that, to be most effective, Quinine should be taken, one dose, (10 grains for a person of 15 years or older), *every night before retiring, for eight weeks without intermission.* If a person is ill with acute malaria he should take the dose according to his age about three times each day for not less than three days. This will stop the fever or chills and fever. He should then take one dose every night for eight weeks to get the malaria out of his system. Said to be 100% efficient.—See also C. C. Bass, N.Y. Med. Jl., June 20, 1923, per Jl. Trop. Med., Aug. 15/23,270.

Calomel salts and initial large doses (30 to 45 grains daily) of Quinine. Malaria in Antigua.—W. M. McDonald, B.M.J. i./22,597.

Necrosis of muscle caused by Quinine injections into the buttocks—it was not possible to determine *form* of Quinine.—P. Figdor and D. D. Pinnock, B.M.J. ii./22,14.

Writer deplores 'fetish' of giant doses given to reduce high temperature in malaria. Cinchona preferable to Quinine. In hyperpyrexia use of antipyretics such as Aspirin, Antipyrin, etc., until moderate temperature attained, when Quinine may be resumed.—Jl. Trop. Med., Aug. 15/22,266,

Muscular necrosis an invariable occurrence with ***intramuscular administration*** of Quinine in malaria. Damage is intensified, in case of alkaloid, by use of solvents such as Ether, Alcohol, Olive Oil or Creosote,

and natural fat. Necrosis evident one hour after injection in man, and within ten minutes in animals.—Jl. Trop. Med., Jan. 1/23,12.

Intramuscular use of Quinine Salts was *condemned* by the Medical Service of the E.A.E.F.—A. R. Balmain, B.M.J. i./20,381.

Quinine in combination with Arsenic, in the treatment of chronic forms of malaria, more efficient than Quinine alone. Methylene Blue used in combination with Quinine in cases of quartan fever which do not react to Quinine alone.—R. N. Chopra, per Jl. Trop. Med., Feb. 15/23,69.

Relapses.

In the majority of relapsing cases, Quinine *per os* is adequate—20 grains either daily or twice weekly during stay in hospital. Where this is inadequate combined oral and intramuscular administration (60 grains daily for 4 days).—E. B. Gunson and co-workers, L. i./18,866.

The results of systematic investigation in "anti-relapse quinine prophylaxis" indicate that short intensive treatment, *e.g.* up to 180 grains of sulphate or hydrochloride in 3 days, effects cure in a substantial proportion of cases.—L. i./18,301.

Never seen a patient relapse a second time while taking 20 grains a day. In spite of general opinion, quinine may well be commenced *per os* as soon as malaria parasites have been found. To wait until temperature comes down is wasting time—in some it never comes down until patient dies. Intravenous and intramuscular injections should be reserved for persistent vomiting or coma.—W. Fletcher, L. ii./18,432.

Relapses can be cut short by Quinine Sulphate in solution 10 grains three times a day for a week. After the week give ten grains regularly once a day.—Sir Ronald Ross, per T. H. Jamieson, B.M.J. i./19,739. *See also our page* 714.

Prophylactic Use.

In taking Quinine as prophylactic to bear in mind that it destroys the parasite more surely at moment of sporulation—as a rule, *i.e.*, once in 48 hours; take 10 to 15 grains once every 8 days instead of small quantities daily.—B.M.J. ii./05,1289. Give it a few hours before the paroxysm.—Pr. Feb., '09,246. The general opinion is that it acts directly by killing the parasite.—T. R. Hewlett. It has little effect on the young endocorpuscular forms of the parasite.

On the first day of the month give a dose of Calomel and after the bowels are well cleared, 15 grains of Sulphate in dilute acid after a good meal. Repeat this on the 15th of the month. Pay attention to bowels at all times.—E. Yeates, B.M.J. i./18,603.

Enquiry in Forces in Macedonia. It is a bare investment for immigrants in the absence of protection against mosquito bites. Quinine may be little more than a pious fraud merely guided by public opinion. The problem wants working out scientifically on experimental lines.—C. H. Treadgold, B.M.J. i./18,525. *Cf.* Abst. Malaria in Macedonia *antea* p. 715.

The only prophylactic for troops is 1/20 grain Arsenious Acid daily. Quinine is curative *only*.—C. A. Johnston, B.M.J. i./18,586.

Thorough treatment ranging from 5 to 10 grains on two successive days per week up to 20 grains daily, failed to prevent incidence of malaria in Salonica in 1916—17. It was estimated that at least 80 to 90% of units were infected. The prophylactic quinine was

dropped in 1918 as no dose that could be tolerated had any protective value to troops exposed under campaigning conditions.—G. T. Rawnsley, B.M.J. i./19,501.

Query as to whether Quinine Sulphate is any use as a prophylactic against malaria. When tablets were used they more often than not were passed in the motion undissolved. Quinine Hydrochloride Tablets were not issued.—W. H. Sutcliffe, B.M.J. i./19,726.

Quinine prophylaxis is a *so-called* preventive measure. The late J. C. McWalter at the Cambridge B.M.A. Meeting, 1920, exploded the doctrine that Quinine *prevented* malaria. Capt. Cecil Alport in "Malaria and Its Treatment" shows that the treatment at Salonika was a colossal and expensive failure. A good mosquito net is the best preventive.

Failure of prophylaxis with Quinine attributed to tablets which fail to disintegrate and which are voided intact. Tablets common on the Gold Coast which are incommoded neither by hitting with a hammer nor by keeping 3 years in dilute Hydrochloric Acid.—M. Blanchard, per T.D.B. 19/22,872.

Malaria in England.

Fatal cases of æstivo-autumnal malarial fever in England.—A. J. Hall, E. H. Wlliams and J. S. C. Douglas, L. i./18,734.

Treatment in England. Discussion of Quinine Dosage.—B.M.J. ii./19,744; see also W. H. Willcox, *ibid.* 796, and L. ii./19,1105; Sir R. Ross, 863; T. H. Jamieson, L. ii. /19,266; S. P. James, *ibid.* 1016.

Antimalarial measures in England. Dangerous areas and Quinine prophylaxis.—A. Macdonald, B.M.J. i./19,669.

Anopheline Mosquitos in Great Britain. Three species of Anopheles indigenous in Great Britain. Of these, two—*A. Maculipennis* and *A. Bifurcatus*—are known to be malaria carriers but in view of relative infrequency and many other factors, can hardly be viewed as a source of danger in spreading malaria. Of the millions of Anopheline mosquitos bred in a locality only a few would be likely to bite a human being at all, fewer would be likely to bite an infected human being, fewer still would bite an infected person whose blood contained sexual parasites suitable for transmission into a mosquito.—B.M.J. ii./18,63. See also L.ii/18,151.

Risk of spread of malaria in England. Occurrence of Anopheline mosquitos.—B.M.A. Discussion, B.M.J. i./19,490.

Fatal case of malignant tertian malaria contracted in North of England.—E. E. Glynn and J. C. Matthews, B.M.J. ii./20,811,871, T.D.B., Vol. 17, 1921/136.

For further notes on Malaria treatment see Quinine Acid Hydrochloride.

In puerperal sepsis 2 to 5 grains every 4 hours, or 10 grains twice daily in form of suppository acts favourably on the nervous and general system.—B.M.J. ii./09,1038.

Prolapsus uteri treated by local injections of 40 to 80 minim doses of 1 to 5 Solution of Quinine Sulphate prepared by dissolving Quinine Sulphate 12 grains in 30 minims of dilute Sulphuric Acid, and 30 minims of distilled water.

The object is to produce effusion of lymph, which will then form new connective tissue and thus strengthen the ligaments, the uterus being mainly held up by the connective tissues running from the side of the pelvis with the vessels to the side of the uterus. Inglis Parson, Pr., March, 09,358.

Pneumonia.—Quinine given in the earliest possible moment very closely approaches a specific. Continuous treatment with small doses every two or three hours. Quinine is inimical to the progress of most acute infections. In the case of pneumonia it acts remarkably in limiting the spread of consolidation and in altering for the better the entire aspect of the disease. Calomel must be given at the outset to cleanse the whole alimentary tract. Sodium Sulphate may be combined with the Quinine.—W. J. J. Arnold, B.M.J. ii./13,102.

The late R. W. Allen considered Quinine a useless drug theoretically for treatment of a common cold. It is only antiseptic in strength of at least 1

in 500 solution. and a few grains daily internally are not likely to reach the nasal mucus to disinfect it.—L. ii./08,1659.

In exophthalmic goitre.—For two weeks quinine in large doses (1·5 to 2 gm. daily), the drug being pushed to the utmost limit short of producing tinnitus. Then one week with Sodium salicylate, 2 to 4 Gm. daily, then two weeks under calcium chloride, 3 to 4 grammes daily, an interval of eight days being allowed after each medicament. Salt-free diet should be enjoined, sodium chloride being found to hinder, at least partially, the curative action of calcium chloride. —Jour. de Med. de Paris, Dec. 17, 1910, *per* Pres.

Bedsores treated by an ointment of Quinine alkaloid 4 grains, Oleic acid 12 grains, dissolved on a water bath and mixed with Resin Ointment 1 ounce, said to be useful.—Pres., Nov., 1911, p. 281.

Acute lupus erythematosus well treated by 10 grains of quinine three times daily.—P. R. S. M. Dermat, Sect., 1911, 51.

Puerperal septicæmia well treated by internal use of 2 grains every four hours; also used with advantage in perityphlitic abscess, gall bladder abscess and empyema immediately after operation and prior to and after operations in bone and joint disease.—V. J. Glover, L. i./17,352.

To induce sleep. Quinine—1 to 2 grains at bedtime stated to have excellent effect (from the '*Hospital*').—P.J. ii./13,526.

Quinine over lengthy periods will produce deafness.—A. S. Gubb, B.M.J. i./20,131.

Blackwater fever. No evidence that Quinine administered by any method during an attack increases severity or influences progress of the disease apart from its effects on malaria.—L. S. Dudgeon, Pr., April, 1921, p. 283.

EFFECT OF QUININE ON THE UTERUS. It does not excite the normal pregnant uterus and therefore will not act as abortifacient in health, but it will excite the uterus in pathological conditions and strengthen uterine contractions in labour.—B.M.J. i./23,156.

QUININE AMBLYOPIA. 12 5-grain tablets of Quinine caused giddiness, nausea, vomiting and loss of sight within three hours. Recovery under Amyl Nitrite inhalation and Sodium Nitrite in 2 grain doses.—H. and R. Gainsborough, per Pres., Feb. 23, 75.

Quinine administered *per rectum* in malaria preferable to administration *per os*, in height of fever.—E. Bran, per Jl. Trop. Med., Mar. 15/23,101.

Quinine given per rectum with disastrous results—severe pain and passing of blood and mucus. It should not be given in this way when any other means are available.—W. Fletcher, Jl. Trop. Med., July 2/23,229.

Quinine tablets should not be given to DYSPEPTICS. They should be taken with food, and never given to patients on a hydric diet. Case recorded in which 17 tablets of Sulphate of Quinine were emitted in two stools in 48 hours.—R. Le Dentu, per Jl. Trop. Med., Nov. 1/23,336.

Collunarium Quininæ, Quinine Nasal Douche.

Quinine Sulphate 1, Water 1 000.

Used in hay-fever. If a stronger solution be required, use the Acid Sulphate or Hydrochloride of Quinine; avoid excess of acid.

Mistura Chlori cum Quinina (Burney Yeo).

To Potassium Chlorate, in powder, 30 grains, in a 12-ounce bottle, add Hydrochloric Acid 60 minims; cork and shake well to liberate chlorine; absorb this by gradually adding, and shaking after each addition, Distilled Water *q.s.* to 11 ounces; add Quinine Sulphate 24 grains (or 36 grains if ordered), Syrup of Orange 1 ounce. *Dose.*—1 ounce (**30 Cc.**) every 2, 3, or 4 hours for typhoid; it quickly cleanses the tongue.

Pills and Tablets of 1, 2, 3, 4, and 5 grains are prepared.

Perles of Quinine Sulphate contain 1½ grains (**0·1 Gm.**) in each.

℞ ℙ **Pilula Quininæ Hydrargyri et Opii.**

Quinine Sulphate 1½ grains, Grey Powder 1 grain, Opium $\frac{1}{6}$ grain, Quassia Extract *q.s.* thrice daily after food.—B.M.J. i./09,1464.

In syphilis Quinine is useful before or after a course of Mercury.

Acts beneficially in any septicæmic state with fever, whether due to gonorrhœa, syphilis, or enteric. Quinine, Opium and Mercury are sheet anchors in early syphilis.—B.M.J. ii./09,78,504.

℗ **Pilula Quininæ Ipecacuanhæ et Camphoræ.**

Dose.—One night and morning.

Quinine 2 grains, Ipecacuanha ¼ grain, Camphor ¼ grain, Liquid Carbolic Acid ¼ minim, have been advocated as preventive of plague. Nim fumigation (burning Azadirachta) also suggested.—L. i./09,637.

ℙ **Pulvis Quininæ Compositus.** *Dose.*—One powder.

Quinine Sulphate 5 grains, Phenacetin 5 grains, Arsenious Acid $\frac{1}{50}$ grain, Nux Vomica Extract ¼ grain, Milk Sugar (*q.s.*) to 12 grains. One powder (or cachet) every four hours till the fever breaks. This is used as a fever remedy in Demerara and is excellent.—Ph. Notes.

℞ ℙ **Pulvis Quininæ, Arsenii, Hydrargyri et Ipecacuanhæ Compositus.**—*Dose* in Cachets.—One at eleven, another at bedtime.

Quinine Hydrochloride 5 to 7 grains, Arsenious Acid 1/36 to 1/24 grain, Compound Ipecacuanha Powder 3 to 4 grains, Calomel 1/10 to 1/6 grain.

Sir J. Cantlie has found this a valuable treatment in chronic malaria with enlarged spleen. Each ingredient serves a useful purpose—the Mercury for its antiseptic effect, the Arsenic enhances the activity of the Quinine, the Opium, not only from its traditional use in malaria but also from the writer's experience is of value as an addition to the prescription —Jl. Trop. Med., 1914

'Old English' Fever powder. Quinine Bihydrochloride 3 grains, Arsenious Acid 1/36 grain, Compound Soap Pill 1 grain, Mercury Subchloride 1/12 grain. Three times daily in a cachet. Malaria well treated. The following daily dose made up in the form of a pill recommended as prophylactic :—Quinine Bihydrochloride 1½ grain, Arsenious Acid 1/100 grain, Compound Soap Pill 1/10 grain, Calomel 1/25 grain.—Jl. Trop. Med., Aug. 15/22,265.

Plea for reversion to use of **drugs in their natural state.** Opium and Castor Oil the two treasurers of the doctor's armamentarium. Quinine has taken the place of Opium in the treatment of malaria with poor results—efficacy of the old "English Fever Pill". Evils of State interference.—Sir J. Cantlie, Jl. Trop. Med. Jan. 15/23,30,

Mistura Quininæ Effervescens.

Quinine has a reputation in colds, but it is best given in effervescence. The following prescription is useful :—

Mixture A.—Quinine Sulphate 2½ grains, Citric Acid 10 grains, water to ½ ounce.

Mixture B.—Potassium Bicarbonate 10 grains, Ammonium Carbonate 2½ grains, Syrup of Orange 1 drachm, water to 1 ounce.

One tablespoonful of Mixture (A) with two of Mixture (B) in effervescence thrice daily.—Leonard Williams, per C. & D., June 1921.

Roseberry's Chlorine Water Mixture (Modified). An infant suffered from vomiting and diarrhœa and was unable to take milk or foods such as Glaxo. The usual antiseptic and astringent infantile powders failed to cure. The modified Roseberry's Mixture containing Quinine Sulphate with Salol 4 grains, Mucilage of Tragacanth *q.s.*, and Chlorine Water to 1 ounce, thrice daily, gave no lasting relief. Rectal Saline was also tried. Finally, as last resource, when the child was not expected to live, weak tea infusion saved its life.—Capt. G. H. Wood, per Jl. Trop. Med., April 15/22,109.

Tinctura Quininæ Ammoniata (*Off.* and B.P. 1898).

Dose.—½ to 1 drachm (**2 to 4 Cc.**).

Quinine Sulphate 2, Alcohol (60%) 90; mix and add Solution of Ammonia 10. The Quinine precipitates on adding to water; a few grains of Tragacanth will suspend the precipitate; with syrup of orange it is palatable, and bears dilution better; it remains bright if mixed with aerated water. Should be kept in the dark, or it will become discoloured.

Slipules and **Tablets** of the above are prepared, each equivalent to 1 drachm.

Mistura Quininæ Composita, L. H. *Syn.* **Broadbent's Mixture.**

Dose.—½ ounce (**15 Cc.**).

Ammoniated Tincture of Quinine 1 drachm, Solution of Ammonium Acetate 2 drachms, Compound Tincture of Camphor ½ drachm, Ammonium Carbonate 2 grains, Peppermint Water to ½ ounce.

Tablets Ammoniated Quinine Compound, each equivalent to Ammoniated Tincture of Quinine ½ drachm, Capsicum $\frac{1}{10}$ grain, Camphor $\frac{1}{10}$ grain, Caffeine Citrate ¼ grain, Aloin $\frac{1}{20}$ grain. Serviceable in influenza.

Tablets Quinine Acid Sulphate 1 grain with Camphor $\frac{1}{5}$ grain, also this combination Ⓟ **with Aconite Tincture** 1 minim.

℞ Ⓟ **Tablets, Quinine, Camphor, Morphine, and Atropine**—Camphor ½ grain, Quinine Sulphate ½ grain, Morphine Sulphate $\frac{1}{24}$ grain, Atropine Sulphate $\frac{1}{2000}$ grain.

For common colds especially where excessive running at eyes and nose.

Ⓟ **Tinctura Antiperiodica.** *Syn.* **Warburg's Tincture**

Warburg's Tincture was originally introduced by the maker as a proprietary remedy, but he published his formula, and in 1890 was in absolute penury.—C.D. i./13,598.

Socotrine Aloes 240 grains, Rhubarb 80 grains, Angelica Fruit 80 grains, Elecampane Root 40 grains, Saffron 40 grains, Fennel Fruit 40 grains, Prepared Chalk 40 grains, Gentian 20 grains, Zedoary Root (*Curcuma Zerumbet*) 20 grains, Cubebs 20 grains, Myrrh 20 grains, White Agaric, in powder, 20 grains, Opium, in powder, 2½ grains, Black Pepper 4 grains, Cinnamon 8 grains, Ginger 8 grains, Alcohol (60%) 1 pint. Macerate for 7 days, press and strain. Dissolve in the product:—Quinine Sulphate 160 grains, Camphor 20 grains. After 2 days filter, add Alcohol 60% *q.s.* to 1 pint.

As it is apt to purge as above prepared, the aloes may be omitted *if so prescribed.*

Dose.—1 to 4 drachms or more (**4 to 15 Cc.**)

Flavoring.—Glyl Coriandri (quadruple dose), Glyl Menthæ Piperitæ (ditto); Extractum Glycyrrhizæ Liquidum.

Originally directed for Indian Fever, ague, &c., half an ounce as a dose repeated in 2 or 3 hours; before giving the first dose the bowels should be freely opened, and no food recently taken. Between the two doses nothing should have been taken but a little brandy or beef-tea, and this only if the state of the patient required it.

The name 'Antiperiodica' suggests 'abortifacient,' to French Customs Officials.—P.J. i./11,763.

Zedoary Root. *Curcuma Zedoaria* (*N.O. Scitaminaceæ*). *Dose.*—10 to 30 grains (**0·6 to 2·0 Gm.**). Little used now. Ginger replaces it. *Tinctura Zedoari* (*Simplex*). *Dose.*—1 to 2 drachms (1 in 8 Alcohol 90%).

Effervescent Quinine Sulphate.—2 grains in drachm. *Dose.*—1 to 2 drachms, given as soon as fever shows itself.

Quininæ Sulphas Acidus, **Quininæ Bisulphas, U.S., Ph. Ned., Ph. Jap. III.** (now omitted), **P. Hung.** Termed '**Neutral**' in Fr. Cx. and F.E.

$C_{20}H_{24}N_2O_2.H_2SO_4+7H_2O=548{\cdot}496$.

Dose.—1 to 10 grains (**0·06 to 0·6 Gm.**).

Quinine Bisulphate changes into quinicine or quinotoxin—possibly a harmful body. The crystalline salt ($+7H_2O$) decomposes to the extent of 0·25% at 60° C., but the exsiccated shows no decomposition at this temperature. The heating of *strong* solutions is deprecated. The Acid Hydrochloride or the Acid Hydrobromide are better for hypodermic injection.—B. F. Howard and O. Chick, P.J. ii./17,143; C.D. ii./17,612, *vide* also pp. 708 and 709.

Tablets. ½, 1, 2, 3, 4 and 5 grains.

Usually masses of crystals; 59·1% of Quinine. Soluble 1 in 11 of cold water, and is therefore a suitable salt for preparing eye lotions. Three grains to an ounce of water has a specific action on ophthalmic diphtheria. Incompatible with Potassium Iodide.

Malaria Treatment.—Quinine Bisulphate 4 grains in 20 minims of 0·5% Saline solution subcutaneously once daily for five consecutive days in alternate flanks. In addition Arsenious Acid 1/20th grain *per os* and also 5 grains (only) of Quinine well diluted in the early morning—continue for a month.—C. A. Johnston, B.M.J. i./18,586. *We should prefer the Hydrochloride or Acid Hydrochloride.*

Cystitis treated by Quinine Bisulphate 1 in 2,000 as an irrigating solution. Irritation is not noticeable. It will inhibit growth of *B. Typhosus* in the strength of 1 in 30,000.—E. McDonald, Jl. Amer. Med. Assn., Feb. 6/15, 505, per P.J. i./15,287.

Tablets of Quinine Rhubarb Compound, also called **Livingstone Rousers** contain Quinine Acid Sulphate 1 grain, Jalap 1½ grains, Calomel 1 grain and Rhubarb 1½ grains; are given to check malarial poisoning.

In purulent ophthalmia, hypopyon and keratitis *Guttæ* containing 3 grains with 12 grains of boric acid per ounce are useful.

Esanofele.—A proprietary preparation in pill form containing in each Quinine Bisulphate 0·09 Gm., Arsenious Acid 0·0009 Gm., Iron Citrate 0·027 Gm., Extract of Bitter Herbs 0·145 Gm.

Used in malaria.

Dose.—For a child 3 to 6 years: two pills daily preferably in the morning, *e.g.*, one at 6 and another at 9. For 7 to 14 years two at 6 and two at 9. For adult six daily *e.g.*, two at 5, 8 and 11 a.m. respectively. Fifteen days constitute a course.

Quininæ Tannas, **Quinine Tannate, P. Jap.** (30% Quinine). **P. Helv.** (30—35%), **P.G.** and **P. Dan.** (30—32%).

P. Austr. and **P. Hung.** give method of making from the sulphate.

$C_{20}H_{24}N_2O_2,3C_{14}H_{10}O_9+8H_2O(?)=1434{\cdot}86$.

Dose.—1 to 4 grains (**0·06 to 0·25 Gm.**). An amorphous yellowish white powder, obtained by the decomposition of the sulphate with a solution of tannin, contains 22·6% of Quinine (U.S. requires between 30 and 35%) and is slightly soluble in water and about 1 in 3 alcohol 90%. Being almost tasteless is recommended for children, to be given in milk.

It has, however, the disadvantage of splitting up only slowly into its constituents in the intestines, hence lacks in promptitude and certainty.—P. May.

With 1 molecular proportion of Neutral Quinine Sulphate to a little more than 3 of Tannic Acid the precipitation is complete.—Schmidt.

Tabellæ Quininæ Tannatis.

Contain 1 grain in a chocolate basis. Suitable for children. As a prophylactic to malaria. Have also been given for whooping cough and as a stimulant in entero-colitis in children, and with ergotin for sweating.

Quininæ Valerianas. 'Basic' Quinine Valerianate, Fr. Cx., P. Ital. IV. $C_{20}H_{24}N_2O_2,C_4H_9.COOH=426{\cdot}413$.

Dose.—1 to 4 grains (**0·6 to 0·25 Gm**).

White crystals, or powder with slight valerianic odour, contains 76% of Quinine, soluble 1 in 80 to 90 of cold water.

Pills containing 1 grain each of the Valerianates of Quinine, Iron, and Zinc. For nervous headache and hysteria.

For treating paroxysmal sneezing, H. Tilley finds these useful.

℗**Capsulæ Valerianatum Compositæ.** Form I.

Dose.—One thrice daily. Valerianates of Quinine, Iron, and Zinc 1 grain each, Nux Vomica Extract ¼ grain, with or without Cascara Extract 1 grain. Taste and odour covered with Saccharin and Mint. Nervine tonic.

℗**Capsulæ Valerianæ Compositæ**, Form II. *Dose.*—One after meals thrice daily. Valerian Extract 2 grains, Phenol 2 grains, Strychnine Hydrochloride 1/40th grain, Codeine ¼ grain, Rhubarb Extract 1½ grains.

Tonic, antiseptic and nerve sedative for use in dyspepsia.—G. Rankin, B.M.J. i./15,1036.

Quinine Ethylcarbonate. P. Jap., P. Helv. *Syn.* ✱Euquinine. (T.M. 317242), $C_2H_5O.CO.OC_{20}H_{23}N_2O=396{\cdot}355$.

Patent 4991 (1896) and 22639 (1899)—now public property. German Patent 91370 (18/12/95) with addition of 123748 (30/1/00). U.S., Patent 585068 (1897). *cf.* also Aristochin and Chinaphenin.

Dose.—3 to 15 grains (**0·2 to 1 Gm.**) in cachet.

Manufacture.—Prepare Ethyl-Chlorocarbonate (B. pt. 94° C.) by passing Carbonyl Chloride into Absolute Alcohol, and allow the rectified product to react with Anhydrous Quinine in Ethereal solution when the Quinine Ethyl Carbonate is obtained on evaporating and washing with Sodium Carbonate solution *q.s.* to remove the acid.

$C_{19}H_{20}N_2.OCH_3.OH + ClCOOC_2H_5 = C_{19}H_{20}N_2.OCH_3.OCOOC_2H_5 + HCl$.

The method is reasonable chemically but the final substance is difficult to crystallise. This we believe is due to the fact that Carbonyl Chloride prepared by the usual laboratory processes is impure.

The patent specification processes are probably misleading. They speak, for example, of adding gradually Quinine 6·5 kilos to "30 kilos of Benzol solution containing 12% of Phosgene gas," etc., or "adding Quinine 5 kilos to a solution of 1·8 kilos of Chloroformic Ethyl Ether in 20 kilos of Benzol."

White needle crystals, M.pt. 93 to 95° C., with little taste, sparingly soluble in water, more so by addition of dilute acid; easily soluble in alcohol. Intended to replace quinine. **Tablets** contain 8 grains.

Whooping Cough has been treated with it.

Other salts of Quinine in occasional demand are the **Hydrochloro-sulphate, Iodate, Lygosinate** and **Sulphocarbolate.**

Aristoquinine *Syn.* ✱**Aristochin.**

$CO(C_{20}H_{23}N_2O_2)_2 = C_{41}H_{46}N_4O_5 = 674{\cdot}605$. The carbonic ester of quinine in white tasteless powder containing 96·1% of quinine *Dose.*—1 to 10 grains (**0·06 to 0·6 Gm.**) according to age.

Trade Mark 238180/1901 removed from Register in 1915, but No. 322521 remains.

Patents: 16564/1898—now public property. U.S.A. Patent 625075/1899.

Example of process from the patent specification:—

Dissolve 1 kilo. of anhydrous quinine in 4 kilos. of chloroform, and pass 76·4 Gm. of phosgene into the cooled solution. To remove quinine hydrochloride formed in the process and small quantities of unaltered quinine, wash the liquid with 1 per cent. acetic acid in water until the extracts no longer taste bitter. The diquinine carbonic ether is then removed from the chloroform solution by shaking with 1 per cent. sulphuric acid in water. Finally treat the sulphuric acid solution with alkalies and shake out with ether. Evaporate the ether and recrystallise the residue from alcohol or benzene.

We have tried the above process, and on the whole the method seems probably correct and indicative of the actual process employed. Further experience is necessary to increase the yield of the substance, which in our hands was miserably poor.

A few suggestions may be offered:—

Carbonyl Chloride should be available in cylinders as a commercial article. Failing this, the gas as made by the usual processes (oxidising Chloroform with Potassium Dichromate and Sulphuric Acid or with Fuming Sulphuric Acid alone) should be passed through intervening wash bottles—one containing Chloroform would be useful—to condense the acid fumes which are liable to interfere with the reaction. Water is, of course, inadmissible, as it decomposes Carbonyl Chloride. We should doubt if Benzene is a good solvent for crystallisation. It would be well to try dissolving the final substance in Alcohol and adding water or some other liquid miscible with alcohol in which the Quinine compound is relatively insoluble, a little at a time with stirring until the precipitated body just redissolves and a faint opalescence is formed and allow to stand in a cool place. This method we have found useful with numerous alkaloidal substances.

Insoluble in water. Given for malaria, typhoid, influenza, and in small doses for pertussis.—B.M.J.E. ii./04,44.

Incompatible with Acids and Alkalis.

Solubility of Quinine, Cinchonine, Cinchonidine, and Quinidine Salts in Water at 25° C.—a considerable research.—Am. Jl. Ph. April, 1910, p. 175;

Analysis. The compound should, of course, be free from Chlorine. A commercial sample contained 6·9%.—L. ii./21,400.

Quinoidine.—*Dose.*—2 to 4 grains (**0·12 to 0·25 Gm.**) thrice daily.

The name given to a mixture of alkaloids (discovered by Seturner, 1830) in the mother liquor after the crystalline alkaloids have been separated. It occurs generally as a dark treacly compound or as a hard mass.

In the malarial season of 1912 investigations were commenced into the efficacy of the Amorphous Alkaloids of Quinine in the treatment of malaria, and the results obtained went to show that these substances are of greater value than the Sulphate and Hydrochloride of Quinine.

It is supposed that the amorphous nature of the Quinoidine renders it more assimilable and possibly accounts for its greater efficacy.

The Sulphate of Quinine was more effectual than the Hydrochloride, 45 to 60 grains of either salt were sufficient to bring any malarial temperature to normal.

With regard to Quinoidine:—

Benign tertian cases required 9 to 13½ grains of Quinoidine to stop fever; *Malignant tertians* required an average quantity of 10 to 16 and *Quartan cases* an average of 22 to 24 grains.

℗ **Laverain Tablets.** *Dose.*—Up to 6 or 12 during the day.

Contain Quinoidine 2 grains, Ammonium Picrate ½ grain, and Arsenious Acid $\frac{1}{100}$ grain. The Picrate is employed as an anti-malarial drug in addition to the quinoidine. The Arsenic acts as tonic. The preparation is said to be prompt in reducing malarial fever, and specific for the malarial parasite—good in prophylaxis. A preliminary purge to be given (Calomel and Soda) washed down with Mistura Alba. Out-patients are given 20 tablets, enough for three days' use.—Maj. Waters, Ind. Med. Gaz., 1916. See also D. G. Marshall, L. ii./18,417.

RESORCINUM (*Off.*).

Syn. **Resorcinol,** $C_6H_4(OH)_2$=110·078. *Dose.*—1 to 5 grains (**0·06 to 0·3 Gm.**).

Metadihydroxybenzene is in white crystalline plates, melts at 230° F. (=110° C.) and is easily volatilised. Preserve from light.

Manufacture.—Benzol-Disulphonic Acid is prepared by heating Benzol with fuming Sulphuric Acid and the liquor poured into water to which Milk of Lime is added. The solution is filtered and the filtrate treated with Sodium Carbonate. It is again filtered and the filtrate evaporated and afterwards fused with Sodium Hydrate. The melt is cooled and dissolved in water, acidified with Hydrochloric Acid and, after boiling off the Sulphur Dioxide and filtering off tarry matter, is extracted with Ether and then re-crystallised from Benzol.

For a more detailed account see Edition 17, Vol. I, p. 681.

Soluble 1 in 1 of water, 2 in 1 of alcohol, 1 in 20 of olive oil.

Incompatible with spirit of Nitrous Ether, and with caustic alkalis.

Uses.—It possesses useful antiseptic properties. It coagulates albumin, and has a caustic action on the skin, but a 2% solution is not irritating. It is an effective topical remedy in diphtheria, and produces no injurious consequences. A 5% solution may be injected into the bladder without causing any irritation, and is useful in inflammatory affections of this organ, likewise in vesical catarrh after gonorrhœa; 5 to 10% solution is of service also in syphilitic sores and skin diseases; and a 1% solution improves unhealthy wounds, and is useful as an eye lotion in conjunctivitis. Given internally, but with great care, it has been used as an antipyretic but it cannot be recommended, if so given it must be well diluted with water and should be flavoured with syrup of orange or glycerin. In whooping cough, 10 minims of 2% solution or this strength used as spray is of service, as also in hay fever.

Epithelioma and rodent ulcer have been treated with ointments and plaster up to 30% strength. It is applied locally to condylomata and mucous patches. Pigment of 10% relieves irritation of tubercle of larynx. For eczema and alopecia, cold cream with 2% of resorcin is useful. Used in the form of paste it has proved useful in ichthyosis—favours desquamation and removes effete horny layer.

In gastric ulcer 2 to 5 grain doses have antiseptic action.

Resorcin externally proved fatal. A boy of 16 suffering from extensive lupus treated with a paste containing 25 to 30% Resorcin in Gelanthum. Patient became unconscious, cyanosed and motionless with tongue swollen and fixed between jaws. Camphor, venesection, etc., of no avail. Resorcin dangerous over large surfaces.—B.M.J.E. i./15,33.

Tablets, 3 grains (0·2 Gm.). *Dose.*—1 to 3.

Glycerinum Resorcin, G.H.

Resorcin 4, Distilled Water 4, Glycerin to 15.

In chronic urethritis resisting treatment, a single injection (25% resorcin) in fresh cases has been found beneficial.

Lotio Resorcini. *Syn.* SPIRITUS CAPILLARIS.

Resorcin 1, Ether 1, Castor Oil 1, Eau de Cologne 10, Alcohol (90%) 35. Useful for dandruff and alopecia. *Soap and alkali must be removed before use, or hair may be discoloured.*

Lotio Resorcin et Acidi Salicylici.

Salicylic Acid 30 grains, Resorcin 1 drachm, Spirit of Rosemary 1 ounce, Saponin 1 drachm, Lanolin 1 ounce, Aqua Mellis to 10 ounces. Dissolve the Salicylic Acid and Resorcin in the Spirit of Rosemary, melt the Lanolin, add the Saponin dissolved in a little water, place in a warmed mortar, add the Spirituous Solution just mentioned and the Aqua Mellis in parts to make a cream.—C.Fox.

Lotio Resorcini Composita, St. M.'s H.

Resorcin 10 grains, Methylated Spirit 1 drachm, Water to 1 ounce.

Lotio Capillaris.—A stimulant to the growth of hair. Resorcin 5, Capsicum Tincture 15, Otto of Rose *q.s.* Castor Oil 10, Alcohol 90% to 100.

℗**Lotio Excitans, St. G. H.** For the scalp.

Resorcin 1½ drachms, Mercuric Chloride 10 grains, Glacial Acetic Acid ½ drachm, Chloral Hydrate 3 drachms, Cantharides Tincture 1 ounce, Alcohol 60% to 1 pint.

℗**Lotio Resorcini Pilocarpinæ et Cantharidis.**

Resorcin 80 grains, Pilocarpine Hydrochloride 15 grains, Cantharides Tincture 1½ ounces, Tincture of Capsicum 4 drachms, Spirit of Camphor 6 drachms, Castor oil 10 to 60 minims, Oil of lavender 30 minims, Alcohol 90% to 8 ounces. A useful stimulating lotion in alopecia prematura for use after exfoliative treatment.

Lotio Resorcini et Acidi Borici.

Resorcin 1, Compound Tincture of Lavender 10, Glycerin 10, Saturated Solution of Boric Acid 80, as a mouth wash after operations on the mouth.

Nebula Resorcini.—For a common cold, spray nostrils with 1% solution, to which may be added a 'Solube' Borax and Cocaine Compound.

Gargarisma Resorcin E.L.

Resorcin 15 grains, Glycerin 1 drachm, Water to 1 ounce.

Unguentum Resorcini, R.O.H. Resorcin 2, Soft Paraffin to 100.

Unguentum Resorcini Compositum. **Ihle's Paste,** St. J. H. Resorcin, Zinc Oxide, Starch, of each 5% approx. in Soft Paraffin. Has been used stronger for bromide acne.

Resorcin liquefies with Menthol, Camphor or Phenol, and a small amount of any of these may well be prescribed in addition so as to form a uniform ointment.

Pasta Resorcini Fortior (Lassar and St. M.'s H.).

Resorcin 20, Zinc Oxide 20, Starch 20, Liquid Paraffin 40.

'Mitis' 10, 25, 25, and 40 respectively.

Pasta Resorcini et Zinci Oxidi, K.C.H.

Resorcin 1, Glycerin 1, Zinc Oxide 1, Paraffin Ointment (white) to 8.

Baculum Resorcini.—Resorcin 3, Wax 2, Lanolin 5.

Resorcin Monacetate. *Syn.* ✱**Euresol** (T.M. 355476).

Manufacture.—Mix Resorcin 440 and Acetyl Chloride 320 and allow to interact completely in an open dish. Then heat to 100° C. for ½ hour. Cool, wash free from acid with water, and dry over exsiccated Sodium Carbonate.

A honey-like mass. Dissolves 10 to 30% in acetone, for use in acne, seborrhœa and sycosis. **Euresol pro Capillis** is the same perfumed. It is directed to be made into a Hair Lotion by mixing 2 parts with Alcohol 70%, 32 and Water to 48. Removes dandruff and itching.

Thio-resorcin. Yellowish powder slightly soluble in alcohol; as a substitute for Iodoform; 5% Ointment in skin diseases.

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* SACCHARIN. (T.M. 392328; see also 332891).

Glusidum (*Off.*). *Syn.*—Glucusimide, Benzoyl Sulphonic Imide. Benzosulphinidum, U.S. $C_6H_4 : SO_2CO : NH = 183{\cdot}143$.

Dose.—½ to 2 grains (**0·03 to 0·12 Gm.**) or more.

A derivative of toluol in white, intensely sweet, crystalline powder. Its aqueous solution has an acid reaction; it forms crystalline sweet salts with alkaloids and metallic bases. Solutions of alkalis and their carbonates dissolve it, forming compounds.

Soluble 1 in 400 of water, in alcohol 90% 1 in 38, in ether 1 in 100, incompletely in chloroform, and in glycerin about 1 in 50, slightly in oils and fat, also in acetone.

Use.—Instead of sugar for diabetic and obese patients.

It is not harmful in its effects.—L. ii./17,483; B.M.J. i./18,377.

Saccharin (insoluble) is sold in sweetening powers 300, 450 and 550—the above remarks refer to "550."

Influence of Saccharin on the catalases of the blood.—Some of the recent work on Saccharin has had a tendency to ascribe to this compound an action beneficial to the processes of oxidation in the blood, particularly in diabetes. F. C. Becht finds there is no evidence that it produces any change in the catalytic power either in the positive or the negative direction *per os*. 4 Gm. per kilo is a powerful gastro-intestinal irritant. Given intravenously it produces a marked decrease in the catalase content of the blood. There is no difference from the normal in the case of an animal with pancreatic diabetes.—Jl. Pharm. & Exp. Therap., Oct. 1920.

Saccharinum Solubile, contains about 90% of Saccharin in combination with soda. In yellowish granular, micro-crystalline masses, easily soluble in water, and therefore convenient for flavouring purposes. 1 in 2,000 or 2 grains to an 8-ounce mixture is sufficient.

Dose.—½ to 2 grains (**0·03 to 0·12 Gm.**) or more.

Elixir Glusidi, B.P.C.—*Syn.* **Elixir of Saccharin.** *Dose.*—5 to 20 minims. Gluside 5, Sodium Bicarbonate 3, Alcohol 12·5, Distilled Water *q.s.* to 100. 1% added to mixtures for flavouring.

Saccharin Tablets. Contain ½ grain with Sodium Bicarbonate *q.s.*

SACCHARUM PURIFICATUM.

Syn. Sucrose. $C_{12}H_{22}O_{11} = 342{\cdot}236$.

Crystals or powder, soluble 2 in 1 of water.

In addition to the Refined Sugar obtained from the juice of the Sugar Cane—*Saccharum officinarum* (*Graminaceæ*)—various grades of granular cane and beet sugar both with and without the addition of "blue" are marketed. For the manufacture of Syrups a sugar without the colouring matter is essential. *Off.* and U.S. allow also beet sugar.

Beet Sugar Industry in N. France. An interesting and exact account of sugar preparation. Multiple effect evaporators are used—3, 4 or 5 in series, the concentration being done under reduced pressure—thus preventing in great measure the formation of invertsugar.—W. A. Poucher, P.J.i./17,467

For the Estimation of Sugar by means of Polariscope and other Methods see Vol. II.

Uses.—In heart disease, as also in cancer and phthisis, large amounts are of service. It is changed into glycogen and thence to glucose in the system. It has been given ***intravenously*** as strong as a 50% solution but an isotonic solution (10·3%) would appear preferable. It is added to Infants' foods made of dried milk.

Sugar with caraway infusion is used to hasten and increase mammary flow in Egypt, as well as to bring about a speedy involution of the uterus. Suggested in such cases as sub-involution, when the administration of drugs may have some retarding effect on the mammary secretion.—B.M.J. i./12,14

In various morbid conditions, anæmia, adynamic varieties of rheumatism, in neurasthenic manifestations of neurotic persons, Cane Sugar is beneficial —¼ lb. to ½ lb. for an adult to be slowly eaten daily and a lump or two at odd times through the day or night, but not just before a meal.—B.M.J.i./11,753.

Recent gains in treatment in cardiology. Many cases of incipient rheumatic endocarditis may be prevented from passing into permanent valvular disease by prolonged rest, the administration of Sodium Iodide and application of blisters.—Caton. Chronic heart failure aided by Cane Sugar. *Beet* Sugar is without effect and the Cane Sugar should not be cooked.—W. Gordon, B.M.J. i./21,13.

Sugar versus Alcohol. Reduction in tax of both needed (it is embodied in the 1924 Budget in respect of Sugar).—B.M.J. i./23,523. Sugar thought already to be taken in excess.—R. T. Williamson, *ibid.* 511, see also C. C. Weeks, *ibid.* 611.

Arthritis. Tolerance for sugar is often diminished.—Pringle and Miller, M.P.C. 31/23,85.

Syrupus (*Off.* and B.P., 1898).

Sugar 1, Water to 1½ by weight, Sp. Gr. 1·33. U.S. order Sugar 85, Water to measure 100. Weaker strengths of syrup do not keep well. Potassium Carbonate 1 grain in 12 ounces of Syrup has been found to prevent crystallisation.

A few drops of Chloroform per ounce of *Off.* Syrups will prevent fermentation.—C. D., Aug. 22, 1922, p. 310.

Invert Sugar is prepared by action of dilute mineral acid on Cane Sugar. Consists of a mixture, possibly a loose combination, of equal weights of Grape Sugar (Dextrose) and Lævulose. A useful substitute for cane sugar in dyspepsia—more easily borne in gastritis.

Invert Sugar forms in simple syrup on keeping—that made by cold process produces more than hot. In 18 months it may reach 6%.—P J. ii./16,545.

Lævulose.—*Syn.* **Diabetin, Fructose.**

$C_6H_{12}O_6 = 180·096$.

A whitish crystalline lævorotatory powder (also honey consistence), freely soluble in water, reduces Fehling's Solution.

Manufacture.—May be prepared by hydrolysis of cane sugar on the following lines:—Heat cane sugar 300 dissolved in water 1,200 with addition of Hydrochloric Acid 7 at 70° C for two hours or until hydrolysis is complete. Dilute with further addition of water to 3,000. Add slaked lime 200. Stir until reaction complete and add ice 700 or *q.s.* and stir until the lævulosate throws out. (The glucosate remains in solution with adequate cooling.) Filter, press the precipitate and decompose the latter with Oxalic Acid. Filter and evaporate the filtrate to a syrup. The evaporation must be done *in vacuo*. This syrup will crystallise in time.

Pure Inulin from dahlia bulbs or chicory root which contain 6 to 12% is also suitable for producing pure Lævulose.

Prepare an 18 to 20% solution of it in ½% Sulphuric Acid and warm this on

a boiling water bath for an hour. Neutralise the liquor with calcium carbonate, filter and evaporate the filtrate at a *low* heat to a syrup. Introduce a few crystals of lævulose and stand over sulphuric acid. A crystalline mass of Lævulose will form. Press between porous plates and recrystallise from absolute alcohol employing here also a few crystals of Lævulose as nidus.—Schmidt.

A stronger sweetening agent than cane sugar; has a pleasant flavor. Specially suitable for diabetics.

Lævulose test for liver efficiency. All ordinary sugars, glucose, cane sugar, etc., when ingested, raise the concentration of sugar in the blood, but not lævulose. Thus, with 50 Gm. of glucose, the blood sugar concentration is increased in the first half hour from the usual 0·1 to 0·16 or 0·17%, returning to normal in about 1½ hours. There is no rise with lævulose. This lack of power on the part of lævulose depends on an intact liver. If there is a definite lesion of the liver, lævulose acts, more or less, like glucose *i.e.* there is a marked increase in blood sugar.—J. C. Spence and P. C. Brett, L.ii./21,1362; B.M.J. ii./22,1061. See also Prof. Maclean, *ibid.* 1060.

Identification of Inulin and Maltose by a mycological method. Tables and formulæ.—A. Castellani and F. E. Taylor, Jl. Trop. Med., Feb. 15/23,59.

SANTONINUM.

Dose.—1 to 3 grains (**0·06 to 0·12 Gm.**) in sugar. U.S. *Average dose.*—1 grain. Fr. Cx.: *Max. single dose,* 1½ grains; max. during 24 hours, 5 grains approximately. Slipule No. 5 holds 2 grains.

A neutral crystalline principle. The inner anhydride, or lactone of Santonic Acid, $C_{15}H_{18}O_3$=246·219, obtained from Santonica, the dried flower-heads of *Artemisia maritima var. Stechmanniana* (*Compositæ*).

Syn.—Levant Wormseed, *Flores Cinæ* (*Cynæ*)—P.G., Wurmsamen. Ormesukker (Danish) is a Confection of Santonica.

Artemisia brevifolia (Wallich) found to contain about 1% Santonin, It occurs from Kashmir to Kumaon at 7,000 to 9,000 ft. altitude.—Prof. Greenish, P.J.i./21,2.

A. Mexicana and other species contained none.—Prof. H. G. Greenish and Constance E. Pearson, P.J. ii./22,85.

Further notes on the leaves, root, stem and flowering tops of *Artemisia Brevifolia* as a source of Santonin.—Prof. Greenish and C. W. Maplethorpe, B.P. Conf. 1923; P.J. ii./23,94.

The powdered flowers of a variety of Artemisia Maritima, growing in the Himalayas, form an excellent substitute for the expensive (Russian origin) Santonin.—L. i./23,808.

Soluble 1 in 40 Alcohol 90% and in Oils (1 in 200 of Castor Oil). in Chloroform 1 in 3. Also in Caustic Soda Solution. Insoluble in water. Turns yellow in sunlight.

P.G.V. gives a test for the presence of Strychnine in Santonin.

Adulteration with Acetanilide.—A sample contained 80%.—Rep. Pharm., 1912,18.

Uses.—It is an anthelmintic for round (*Lumbrici*) and threadworms (*Ascarides*), but is inoperative against tapeworm (*Tænia*)—R. It colours the urine orange, and in too large a dose may cause objects to appear of a green or yellow colour. A greenish yellow or saffron colour may be produced in the urine, and if the urine be alkaline a purplish red. It relieves the lightning pains of tabes dorsalis. Hare recommends that immediately after taking a dose of Santonin 2 or 3 grain dose of Calomel is to be given, followed by a saline

purge six hours afterwards, the flow of bile being particularly useful in making the worm let go its hold. In urinary incontinence Santonin will often effect a cure. It has been advised for use in diabetes.

As an anthelmintic it is very active in an oily solution, *e.g.*, **Haustus Santonini et Olei Ricini,** Santonin in powder 4 grains, Castor Oil 3 drachms. Mix and emulsify with Mucilage of Acacia 4 drachms, Syrup 1 drachm, Peppermint Water to 1½ ounces. Saccharin ½ grain added is an improvement. Taken fasting in the morning makes a dose for a child of 6 to 12 years, *but caution.* ***Poisoning has occurred by Santonin given in oily solution.*** Given in powder it is not absorbed and consequently is non-toxic though acting equally well on the parasites. The usual custom is to give the Santonin in powder on two or three nights, following by Castor Oil *in the morning.*

Santonin poisoning by ½ grain. This dose in two drachms of Castor Oil brought away from a five-year-old girl a large number of thread worms and a few round worms, but the child became weak and looked like dying. After three weeks recovered, but was completely blind and remained so for three months.—L. ii./10,1693.

Ascaridiasis well treated with Santonin.—H. Bourges, Jl. Trop. Med., July 15/22,237.

In gastric troubles of nervous origin and in epilepsy.—C.D. ii./05,1052.

In diabetes, Santonin is stated to cause diminution in the amount of sugar eliminated. It appears to act as a sort of digestive (épargne), increasing the power of assimilating Carbohydrates. Course of treatment extends over six weeks, followed by a week or two weeks interval, then continue until disappearance of glucose. A French speciality of this kind contains in addition a tonic balsam and liver stimulant.

Diabetic gangrene well treated by systematic dosing with Santonin. Pills containing ¾ grain (0·05 Gm.) *t.d.s.* increased until 5 grains (0·3 Gm.) *per diem* is given.—Ind. & East. Drug., Mar. '24,63.

Pills and Tablets, ⅓, ½, **1, 2** and **3** grains. *Dose.*—As Santonin.

Confectio Santonini Composita. E.L.

Dose.—1 drachm for a child 2 to 5 years.

Santonin 1, Powdered Ginger 1, Jalap 3, Sulphur 4, Senna Confection 51.

Pulvis Santonini Compositus, Gt. Orm. H.

Santonin 1½ grains, Compound Scammony Powder 2 grains, Calomel ½ grain. Castor Oil or a saline aperient is directed to be given on the morning after administration.

Trochisci Santonini. *Off.* 1 grain (**0·06 Gm.**) in each; one every night for a few nights should then be followed by an early morning aperient.

Suppositorium Santonini.

Contains 3 grains (**0·2 Gm.**) or more if ordered. Should be administered every 2nd or 3rd night, for 3 times. Is an efficient anthelmintic, especially for thread worms, which often infest the anus of children, causing them to have disturbed sleep.

Golden Santonin. *Syn.* Chromo-Santonin

Dose.—2 to 5 grains (**0·12 to 0·3 Gm.**).

A modification of ordinary Santonin formed by exposure to sunlight. C. Begg has issued a book on the diagnosis and treatment of sprue. Special stress is laid on the use of **Golden Santonin.** He gives 3 grains morning and evening in oil for 3 days. B.M.J. review holds that the term sprue has been applied to diseases of different pathology as many cases of sprue have not been benefited by the drug.—B.M.J. i./13,561.

It has been used with some success in enteric. We have received private reports of its good effect in diarrhœa of different natures in India.

Sodii Santoninas. $NaC_{15}H_{19}O_4.3\frac{1}{2}H_2O = 349{\cdot}283$.

Dose.—$\frac{1}{4}$ to 1 grain (**0·016 to 0·06 Gm.**) for adults. White crystals. Should in preference be given in Salol-coated pills or stearettes.

Note.—Santoninic Acid is to be carefully distinguished from Santonic Acid. The former can be made as Sodium Salt by heating Santonin with finely powdered Crystalline Sodium Carbonate. in dilute spirit with reflux condenser. Santonic Acid as Barium Salt is formed when Santonin is added to hot saturated Baryta water. *Sodium Santonate* has *dose* 1½ to 6 grains (0·1 to 0·4 Gm.).

The activity of Santonin is associated with a lactone ring, the Sodium Salt of the corresponding acid being inactive. This is difficult to reconcile with the existing use of Sodium and other salts of Santoninic acid as anthelmintics but the Sodium Salt is not greatly used now owing to toxicity.—T. A. Henry, P.J. i./23,28.

SAPONES.

Sapo Animalis (*Off.*) or Curd Soap is mainly Sodium Stearate. **Sapo Durus** (*Off.*) (Sapo Medicatus, P.G., etc.) or Castile Soap is mainly Sodium Oleate. **Sapo Mollis** (*Off.*) *Syn.* Sapo Viridis is mainly Potassium Oleate (made with Olive Oil—U.S. Cotton Seed Oil).

Sapo Kalinus, P.G., P. Austr. is made with Linseed Oil. Soluble about 1 in 4 water, and 1 in 1 alcohol 90%.

The theory of Saponification is briefly outlined in Vol. II., in which also details will be found on the approximate composition of Pharmacopœial Soaps, Toilet, Shaving and Household Soaps, the use of Resin and Mottle in Soaps, Transparent Soap, Saponification Nos. of Fats and Oils and other data

Sodii Oleas. *Syn.* EUNATROL.

$CH_3(CH_2)_7CH : CH(CH_2)_7,COONa = 304{\cdot}354$.

In 2 and 4-grain pills and is given to dissolve gallstones. Useful as cholagogue. **Capsulæ Sodii Oleatis** contain 5 grains.

Capsulæ Sodii Oleatis Compositæ.

Dose.—One night and morning or 2 at night followed by plenty of hot water.

Sodium Oleate 1 grain, Phenolphthalein $\frac{1}{3}$ grain, Salicylic Acid 1½ grains, Menthol, 1 grain.

Pills of Sodium Oleate 1 grain, Salicylic Acid 1½ grains, Phenolphthalein ⅓ grain, become oily owing to double decomposition between the first two. Mass the phenolphthalein and the Acid with anhydrous wool fat and then the Sodium Oleate in dry powder with the same excipient, mix and stiffen with Athea or Kaolin.

An antiseptic cholagogue combination valuable for gallstones. The Menthol and Phenolphthalein regulate intestinal activity.

Cholelysin said to be composed of a mixture of Sodium Oleate 10 to 15, Validol 5, Valerian Tincture 10 and Peppermint Water to 200. For use in gall-stones. **Tablets** are made.

Sapo Superadipatus, Ph. Ned.
Anhydrous Wool Fat 4, Potash Soap 20, Hard Soap 76.

Sapo Superadipatus cum Pice Liquida, Ph. Ned.
Anhydrous Wool Fat 4, Liquid Tar 5, Potash Soap 15, Hard Soap 76.

Sapo Superadipatus cum Sulfure Precipitato, Ph. Ned.
Anhydrous Wool Fat 4, Precipitated Sulphur 10, Potash Soap 20, Hard Soap 66.

Sapo Mollis Peroleatus.—Tallow 32, Olive Oil 5, Potassium Hydroxide 3, Sodium Hydroxide 2, Borax ¼, Distilled Water 100. Dissolve the Potassium and Sodium Hydroxides and Borax in Water, then heat to boiling, add the tallow and oil—boil until well saponified and proper consistency when cold. —ex Edinburgh Infirmary Pharm.

To Soften Water, *i.e.*, to precipitate the dissolved Calcium Salts, so as to prevent them forming insoluble soaps during the lathering process, a small proportion of Sodium or Potassium Carbonate may be added to the water. Filtration through wood ashes was formerly used for laundry work.

For consideration of **Chalky** and other types of **Waters,** see *Vol. II.*

Medicated Soaps.

Ⓟ Asepso, 3% Mercuric Biniodide.
Ⓟ Biniodide, containing ½%, 1% and 3% mercuric potassium iodide, reliable antiseptic.
Carbolic, toilet and medicinal, strength 5%, 10% and 20%.
Formosyl toilet and medical 10%.
Ichthyol 5% and 10%, in skin affections.
Ichthyol and Salicylic Acid
,, ,, Sulphur 5% each
Lanolin and Ichthyol.
✱ Resinol.
✱ Sphagnol 5 and 15%.
Ⓟ Sublimate 1%.
Sulphur, Camphor and Balsam of Peru, of each 5%.
Sulphur, Camphor, and Carbolic Acid, of each 5%.
✱ Vinolia, medical.
✱ Wright's Coal Tar contains the equivalent of 15% of phenol combined to be unirritating. The oils for scenting purposes are selected so as to be of the highest antiseptic value, containing amongst other important essential oil constituents, thymol, carvacrol and cinnamic aldehyde.—*cf.* Antiseptic powers of Essential Oils, *Vol. II.*

For details of the manufacture of **Medicated Soaps** (direct from Cocoa Nut Oil and Soda Lye), *vide* E.P., XV., p. 713.

Linimentum Saponis (*Off.*). Soft Soap 4, Camphor 2, Oil of Rosemary 0·75, Distilled Water 8·5, Alcohol 90% to 50.

Spiritus Saponis Kalinus (Spiritus Saponatus, P.G.V.).

Is prepared by saponifying Olive Oil 6, with Liquor Potassæ (15%) 7, and Alcohol 7½ in a stoppered vessel by frequent agitation. A small quantity of this product should mix clear with alcohol and water. Add then Alcohol 22½ and Water 17; filter.

Soap and Spirit Lotion Soft Soap 1, in Alcohol 90% *q.s.* to 2.

Ether Soap.

Dissolve Soft Soap 32 in Alcohol (90%) 20, allow them to stand 24 hours and decant carefully from any sediment, then add Methylated Ether Sp. Gr. 0·720, 52 parts. As a detergent prior to operation.

Ⓟ **Ether Soap with Mercuric Iodide,** contains 1 in 1,800.

Mercuric Iodide 25 grains, Potassium Iodide ½ ounce, Soft Soap 2 lbs., Alcohol 90% 1 pint, Ether *q.s.* to 5 pints.

✱ **Formosyl Glycerin Soap.** (*Distinguish from 'Formosyl.'*)

A yellowish liquid (prepared scented and unscented) containing 40% of Glycerin. A bland and soothing preparation for delicate skins. It is a constituent of **Salicifrice.**

✱ **Sterilla** (T.M. 300899).—A Liquid Surgical Antiseptic Soap.

Synol Soap.—A liquid soap containing Cresols and Camphor.

Acetone Soap.

Mix Green Soft Soap 25 with Water 30, and add Acetone 45. For surgeons' use. It is more economical than a spirit preparation.

Pasta Mackintosh. MACKINTOSH PASTE R.V.I.

Soft Soap 7, Powdered Pumice Stone 7, Prepared Chalk 7, Water 1, Cyllin 1.

Search for a specific treatment of tuberculosis.

The main idea underlying treatment in bacterial disease, it is suggested, is the production of the lipolytic or ***fat-splitting ferment lipase*** in the tissues. This, in tuberculosis, acts on the fats and lipoids of the bacillus and is injurious to it. Serum proteins, various tissue Extracts, Sodium Oleate and inorganic Salts such as the phosphates and Salts of Calcium have the power of increasing or stimulating this lipolytic action. The same principle in part underlies treatment by vaccines and tuberculins in which activators or co-enzymes of the fat-splitting ferment are present in varying degree. The tubercle bacillus is known to contain protein, lipoids, fatty acids, phosphate and calcium in addition to a large amount of fats and waxes. In view of this interpretation of the action of vaccines and tuberculins, the products of ferment and bacterial digestion may prove more serviceable than vaccines. It is noted that the serum of patients recovered from tuberculosis markedly accelerates or activates the fat-splitting action, compared with a decreased power in the acute stages. The former contains the products of digested or partially digested tubercle bacilli, the result of lipolytic or bactericidal action. Such products,—fatty acids or particular soaps derived from the action of the lipolytic ferment on the fats and lipoids of the tubercle bacilli may be not only protective or act as stimulants of lipolytic activity but the initial action of the ferment may liberate other contained activators. J. A. Shaw-Mackenzie, B.M.J. i./21,402 *q.v.* for this worker's further refs. The idea has been made use of in the **Sodium Morrhuate Treatment** *q.v.*

Blood serum of recovered mice shows that a natural and increased production of lipase and of fatty acids in the tissues are important factors in the protective mechanism. Sodium Oleate, *inter alia*, increases the action of lipase in vivo and in vitro. (J. A. Shaw-Mackenzie).—W. J. Simpson, L. i./22, 404.

SINAPIS.

Mustard.

The dried ripe seeds of *Brassica nigra* (*Semen Sinapis*, P.G.V., P. Austr.) and *B. alba* (*N.O. Cruciferæ*), powdered and mixed. The condiment sold as mustard consists of this mixture from which most of the oil has been expressed and the cortical portion of the black seed has been removed.

Uses.—In cases of poisoning a tablespoonful in half-a-pint of warm water is an emetic. In small doses is a stomachic and appetiser. Externally a counter irritant when applied as a poultice, or added to hot water and used as a foot bath. It may blister tender skins.

Charta Sinapis. B.P. '98, is made with bruised black and white mustard seeds exhausted of fixed oil, made adherent with **Liquor Caoutchouc**. The oil being removed, the glucoside is more readily attacked by the ferment.

Linimentum Sinapis (*Off.*).

Volatile Oil of Mustard 3·5% in a Castor Oil, Camphor and Alcohol mixture.

Oleum Sinapis Expressum. Rubefacient. Sp. Gr. 0·921 to 0·923.

The average content of Expressed Oil in the black seeds is 26%. In the white 27%.

Comparison of Chinese **Colza Oil** (ex *Brassica Campestris v. Chinoleifera*) Black Mustard, White Mustard, **Rape Oil** and other varieties.—P.J. i./21,519

Oleum Sinapis Volatile.

Average dose.—$\frac{8}{1}$ minim (U.S.).

Consists principally of Allyl-iso-sulphocyanide. Fr. Cx. makes the chemical synonymous with **Oleum Sinapis Aethereale.** Sp. Gr. 1·014 to 1·025. *Off.* and U.S. requires a content of 92% of this substance. ***Soluble*** about 1 in 50 of water, readily in ether and alcohol. This solution is suitable as a rubefacient.

Volatile Oil of Black Mustard is a powerful antiseptic. *Cochlearia Armoracia*, radish, turnip, watercress, contain mustard oils.—Wild, P.R.S.M., Ther. Sec., Dec. /10, p. 19.

Minimum fatal dose of **Allyl isothiocyanide,** was found to be $\frac{1}{5}$ minim per kilo body weight. It cannot be recommended for internal use. Excessive inhalation of the essential oil into the nostril would be dangerous.

Allyl Compounds: Allyl Sulphide, Allyl Isothiocyanate, Acetate and Allyl Alcohol investigated as to action on rabbits and pithed frogs—the Isothiocyanate is most powerful and the Acetate the least. The poisonousness is due to the Allyl contained. They all affect the respiratory system chiefly and the circulation less. A complete research into the physiological action of these bodies.—B.M.J ii./11,609. *Vide* also Oleum Allii Essentiale.

Spiritus Sinapis, P.G.V. Oil (volatile) 1 to Alcohol (90%) 49.

**Musterole* (T.M. 350827). A counter-irritant for rubbing into the skin as preventive against chills and for rheumatic pains.

Thiosinamin.—*Syn.* Rhodallin, Allyl-thio-urea, Allyl-Sulphocarbamide. $SC.NH.C_3H_5NH_2$=116·16.

Dose.—Internally $\frac{1}{2}$ gradually increased to $1\frac{1}{2}$ grains **(0·03 to 0·1 Gm.)** (with caution—in capsule or alcoholic solution). Hypodermically $1\frac{1}{2}$ to 3 grains as in the form of **Fibrolysin** or **Injectio Thiosinamin et Antipyrin.**

(T.M.: Fibrolysin is no longer a Trade Mark. No. 271208 expired 1919 through non-payment of fees. Fibrolysan No. 319529/1909, is also wound up).

Manufacture.—To essential oil of mustard 456 Gm. add in portions strong solution of ammonia 200 Gm. in Alcohol 200 Cc. The mixture becomes hot (or slight warming may be required to promote interaction)—cool down below 40° C. and shake until the odour of the mustard oil disappears. Evaporate at 40° C. to about 650 Gm. and leave to crystallise. Recrystallise from water. The crystals have melting point 74° C. Evaporate mother liquor and wash further crop of crystals with water and then with ether. Slight modifications of this process will be necessary as experience shows. We find that essential oil of mustard is sometimes impure, with the result that a considerable portion of the oil is not converted into the amine, and hence the yield is poor.

Soluble in water 1 in 18, alcohol about 1 in 2, and in ether.

Flavoring.—It is practically void of taste.

Uses.—Hypodermically for lupus and uterine affections. Its application by subcutaneous injection softens scar tissue (10 to 15 minim dose of 10% solution in glycerin): strictures of the gullet have been relieved. Has been used for keloid and in scleroderma.

Tinnitus aurium treated by 5% aqueous solution hypodermically with improvement, dose being increased from 6 to 35 minims, also a 10% solution and a 20% Glycerin Solution. Should be tried before operating on the middle ear or labyrinth for this trouble.—B.M.J. ii./09,1135.

Pericardial adhesions have been treated by 3 grain doses in 80 minims of water, every other day in the flanks, for 30 days.

A case of scar keloid resulting from a burn received 5 injections of Thiosinamin of 0·2 Gm. with each, 1 days interval. Produced poisoning symptoms,

sweating, headache (lasting 2 to 8 days). Ultimately the treatment was curative (after 18 injections).—Münch, Med. Woch., No. 29,1910, p. 1550.

Caution is needed whenever the patient experiences headache after the first injection of Thiosinamin.

To our knowledge the injection of Thiosinamin preparations may cause transient poisonous symptoms.

Injectio Thiosinamin et Sodii Salicylatis.

Dose.—1 to 2 Cc. every two or three days.

Sterules of this *Compound Thiosinamin Injection* prepared with a special solvent are made 1 and 2 Cc. for use either intramuscularly or hypodermically, and sometimes intravenously, are prepared. 1 Cc. contains approximately 0·06 Gm. (1 grain) of Thiosinamin and 0·09 Gm.—1½ grains—approx. of Sodium Salicylate.

Uses.—For relaxing scar tissue, in strictures of the urethra and rectum, in stenosis of the pylorus, rheumatoid arthritis, Dupuytren's contraction and eye affections (corneal infiltrations). Massage and stretching or the use of bougies in appropriate cases may be of value. Also in middle ear disease and for tinnitus—but the "remote action" in such is doubtful, and in pleural adhesions injected locally, or into the gluteal muscles once or twice weekly according to severity of case.

Remarkable effect was obtained, we are informed, in treating a case of contracted tendons in a horse. The tendons were so badly contracted that the fetlock joint became permanently flexed and the front of the hoof rested on the ground. Action restored to normal after injection during a few weeks.

Injectio Thiosinamin et Phenazoni.—Martindale. *Syn.* CICATRICINE.

Dose.—8 to 15 minims (**½ to 1 Cc.**). = **1½ grains to 3 grains (0·1 to 0·2 Gm.)** Thiosinamin, 2½ to 5 grains (**0·16 to 0·3 Gm.**) Phenazone and 1/20 to 1/10 grain Eucaine Lactate.

This preparation contains the Thiosinamin and Phenazone in equimolecular proportions. These amounts give the most soluble combination.

It has been used in the treatment of cicatricial tissue. It should form a useful injection, being non-toxic and non-irritating.

Patents:—

Other substances have the power of furnishing concentrated aqueous solutions of Thiosinamin, which keep well and are suitable for therapeutic purposes. Sodium Biborate, Urethane, Benzoates, Cinnamates, Glycocoll, etc.—Subject of Patent 29,247/1909. See also 22,533/1905—both voided by time.

Unguentum Thiosinamin. *Martindale.*

Thiosinamin 1, Oleum Anseris Benzoatum to 10. In warm weather 5 or 10% of White Wax may be necessary. For carrying out the thiosinamin treatment by external application.

Unguentum Thiosinamin et Antipyrin.—Thiosinamin 10%, Antipyrin 16·5%, in Oleum Anseris Benzoatum. Similar in use.

'Anserine' Mulls of Thiosinamin are prepared 10% strength.

Tiodine, *Syn.* **Thiodin. Thiosinamin-ethyl-iodide.**

$S = C(NH.C_3H_5)(NH_2\ C_2H_5I) = 272{\cdot}13$.

Prepared by heating Thiosinamin and Ethyl Iodide under a reflux condenser. Forms white crystals melting at 68° C. ***Soluble*** readily in water and 1 in 1 in Alcohol (by our experiment).

Ampoules are prepared containing 3 grains (**0·2 Gm.**) of Tiodine.

Dose.—The contents of one ampoule every other day.

✱**Iodolysin** (T.M. 312678).—A similar preparation, stated to contain 43% Thiosinamin and 47% Iodine. **Iodolysin solution** for oral use, 30 minims, containing 1 grain Thiosinamin and 1 grain Iodine, also **Injection** (hypodermic), 15 minims, containing 1½ grains of each. **Ointment** and **Pigment** (local) are prepared. To soften cicatrices and promote absorption of fibrous tissue,—œsophageal and urethral strictures, in chronic arthritis, arteriosclerosis, deafness and paralysis.

Pills are made equivalent to 7½ grains of Potassium Iodide. In rheumatoid arthritis—2 to 6 pills daily after food. Well tolerated and less depressing than Potassium Iodide.—Sir T. Horder, Clin. Jl., July 11/23,330.

Thiodotoxyl. A solution containing 10% each of Atoxyl and Thiosinamin-ethyl-iodide. Used in treatment of cancerous growths.

SODIUM.

Na=23·00.

A soft white metal, decomposing water. Is prevented from oxidisation by keeping under mineral naphtha.

Is employed in making Liquor Sodii Ethylatis (*q.v.*).

For a further note on Metallic Sodium and a Reagent for detecting Sodium Compounds, see Vol. II.

Sodii Acetas.

$CH_3COONa,3H_2O$ = 136·082. *Average dose.*—15 grains.

Colourless crystals or white powder. Soluble in water about 1 in 1 with alkaline reaction, and about 1 in 35 in alcohol 90%. Is rarely used medicinally.

Flavoring—Glyl Pini, Syl Lavandulæ; Syrupus Aurantii.

Sodii Chloridum.

NaCl=58·46 *Dose.*—10 to 60 grains (**0·6 to 4·0 Gm.**). White cubical crystals.

Soluble 1 in 2¾ of water (not more in boiling water) very slightly in Alcohol 90% (about 1 in 200). It produces neither rise in temperature on dissolving (exothermic), nor diminution (endothermic),—it is therefore almost equally soluble in either hot or cold water.

Flavoring.—Syl Coriandri, Syl Menthæ Piperitæ (double dose), Syrupus Zingiberis.

Uses.—Although in common use is not requisite to those having ordinary mixed diet, but is necessary to vegetarians. Given in excess leads to scurvy, while a want of sufficient salt leads to anæmia, debility and œdema of face and ankles. Large doses are emetic and may relax the bowels.

As a *purgative* may be given in dose of 120-240 grains. As a laxative. 75 grains in a tumbler of cold water, it is stated, acts efficiently and without pain. Rectal injections are used to kill threadworms. Hypodermically or into the veins as Normal (Physiological) Saline Solution *q.v.*

Saline Waters and Common Salt. Both men and animals take salt, not because they need it, but because the taste has been acquired—by human beings in early life. Considering the various 'salts in the body,' it is strange that this one only is taken so largely. Estimating that Sodium Chloride forms 1/200 of the body, this would be 320 Gm. for a 64 kilo person. It is common for a man to take an average of 20 Gm. daily. About 2 to 3 Gm. is sufficient. The excess may be harmful, leading to morning diarrhœa, chronic eczema, psoriasis, etc. Some of the chronic diseases of middle and late life are caused by abuse of salt. It stands to disease as foul air does to respiratory diseases. —P.R.S.M.—Feb. '10, Baln. Sectn., p. 59, *et seq.* Probably individuality

has a good deal to do with it. Many persons take large amounts with apparently no ill effect and, *per contra*, many appear healthy on practically nil.—W. H. M.

Saline Solution, Normal. Physiological Salt Solution.

This should be isotonic with the liquid of the blood corpuscles and possess the same osmotic pressure as the liquor sanguinis. For ***man a solution of sodium chloride 0·9%, or approximately 80 grains to the pint*** of boiled water, freezing at closely—0·56° C., is generally used for intravenous injection in hæmorrhage, uterine flooding, or collapse.

The injection should be made *at least* at 105° *F.* (*this is important*), into any convenient vein, the rate of injection varies greatly according to the circumstances ; it may be as rapid as a pint in ten minutes, or as slow as 8 ounces per hour (see refs. *infra.*). Injections are also made into the rectum.

Ringer's Solution. There were several formulæ. Mostly used now is Sodium Chloride 0·8, Potassium Chloride 0·0075, Calcium Chloride 0·01 Sodium Bicarbonate 0·01, Distilled Water to 100. To have the above freezing point should be composed of Sodium Chloride 0·88, Potassium Chloride 0·025 Calcium Chloride 0·02, Sodium Bicarbonate 0·015, Distilled Water to 100.—P.J. i./12,357. P. Jap. IV. adopts the first mentioned.

Ringer's original solution resembled frog's blood in its saline composition Locke altered the composition of the salts contained, increasing the Sodium Chloride from 0·6 to 0·9% and adding Glucose. The cerebro-spinal fluid o man is virtually this modification.—W. D. Halliburton.

Locke's Solution contains Sodium Chloride 0·9, Potassium Chloride 0·042 Calcium Chloride 0·024, Sodium Bicarbonate 0·05, Dextrose 0·1%.—P.J i./15,410.

Ringer's Solution, as also **Locke's Solution, Sterules** are prepared fo dilution : 1 produces 1 litre.

Fischer's Modified Ringer's Solution.

Sodium Chloride 0·5, Calcium Chloride 0·04, Potassium Chloride 0·02 Distilled Water to 100. This is employed in surgical practice instead c Normal Saline, *e.g.*, for dissolving Kerocain.

A Fluid having advantages over Ringer's or Tyrode's Solution This solution possesses constant P_H value of 7·52 at 37°, is isotonic with blood is sterilisable and contains calcium and potassium in a ratio approximatin to that in arterial blood. Similar relation exists between total uni- an bivalent positive ions.

Stock Solution contains sodium chloride 10·5 Gm. potassium chlorid 0·5 Gm., magnesium chloride 0·1 Gm., calcium chloride 0·3 Gm., n/1 phosphori acid 5 Cc., and 50 Cc. of water.

For use filter 50 Cc. and add 1 litre of water, heat and when cool saturat with oxygen, and add 5 Cc. of sterile n/1 sodium carbonate solution.—J.C.S.A 1922, i., 964.

Fortunately only an approximation to an isotonic solution is necessary, a mucous membranes are practically insusceptible to changes in osmotic pressur within fairly wide limits. The solution should be slightly alkalised. 0·1% Sodium Bicarbonate is sufficient.—Marshall.

Note.—The **Lacrymal Secretion** is stated to contain 1·3% Sodium Chloride and 0·5% Albumin. It has been suggested to make eye lotion isotonic.

Saline Solution Sterules contain in saturated solution sufficient fo two pints, hermetically sealed. Are convenient for carrying i the surgical bag.—L. i./99,35 ; ii./00,1866.

'Solubes' Sodium Chloride, 20 grains each, are useful for pro ducing extemporaneously 5 ounces of a normal saline solution.

Uses and References.—Largely employed in surgical shock by intravenous and rectal injection; also in post partum hæmorrhage. Particularly useful in the hæmorrhage of typhoid. Also aids recovery from poisoning by Carbolic Acid, Morphine and Alcohol. Vomiting, recurrent of infants (given per rectum or subcutaneously), cholera, pneumonia, uræmia, relapsing fever, delirium tremens, tetanus and diphtheria have been well treated by subcutaneous and intravenous use.

Eclampsia has been treated by intravenous injection in severe cases, but the treatment is condemned by others as being dangerous, especially where kidneys are involved.

Rectal injections of Saline 2 pints to which Aspirin 15 grains and Brandy 1 ounce were added, following operation in consequence of traumatic rupture of the spleen.—W. H. Cam, B.M.J. i./16,200.

Saline Fluid injected (in cases of surgical shock) to the extent of 300 Cc. per kilo, causes embarrassment and failure of respiration. There is evidence that when the causes of shock are active an injection of fluid cannot force recovery.—J. D. Malcolm, M.P.C., May 17/22,420.

In cholera, before giving hypertonic intravenous injections of saline, precede with an alkaline injection of Sodium Bicarbonate 2 drachms, in water 1 pint.—L. M. Chattergee, T.D.B., Vol. 19, 1922, 740.

✱**Steriloid Jacket.**—This apparatus is designed for giving continuous saline injections either per rectum or subcutaneously. The saline is admitted very slowly—the 2 pints or more may be spread over 48 hours or more. The liquid in the glass vessel is kept at 120° F., and can be adjusted at will—cooling to at or about blood heat as it passes through the tube—the object being to avoid administering the injection too cold. The exact temperature of the injection clearly depends on the rate of flow.—J. Jackson Clarke, L. i./13,938.

Hypertonic Saline Solution.—Sodium Chloride 5% in distilled water with ½% Sodium Citrate added (the proportion is sometimes varied up to 10% of salt and 1% Sodium Citrate).

Based on the well-known theory of Sir A. E. Wright and others that the patient's blood fluids and the white corpuscles are the only bactericides to be counted upon, the idea, broadly speaking, of the Hypertonic Saline treatment is to promote active lymph flow from the wound by the use of this solution and the provision of simple mechanical drainage.

Numerous abstracts of papers in praise of this method of wound treatment are given in the last Edn., p. 700.

As a 'contra' view the following is of interest.

In theory the method is excellent. In practice results varied. Requires careful watching. Not suitable for routine use in a Casualty Clearing Station or even Base Hospital. The strong solution is extremely irritating, causing pain. Salt used to be rubbed into wounds made by the lash—*not* for its healing power. A dressing with it should not be covered with non-permeable tissue which will check outward flow of discharge which it causes.—Casualty Station Criticism.—A. Don, B.M.J. i./16,648.

Antiseptic Power of Hypertonic Saline.

The inhibition of growth, *e.g.*, of *Staphylococcus pyogenes aureus* and *Bacillus coli* by 5% hypertonic saline, experiments showed, is very slight. With 10 or 12% salt, there was no proliferation of the organisms in question.—L. Barrett Anderson and co-workers, L. i./16,1119.

Salt Packs, *i.e.*, by packing wounds with Salt or Salt Tablets in gauze, were much used to wounds in war.

Trunecek's Serum for nervous ailments and high arterial tension.

Dose.—Subcutaneously 1 Cc. to commence with, increasing by ·2 Cc. May also be given by rectum and mouth.

Sodium Chloride 492, Sodium Sulphate 44, Sodium Phosphate 15, Sodium Carbonate 21, Potassium Sulphate 40, Water to 10,000.

Tablets of Trunecek's Serum are prepared 5 grains each, *i.e.*, equivalent approximately to 5 Cc. of the serum. *Daily dose* 3 to 6 with meals. Administration *per os* is equally effective.

For atheroma and sclerosis of arterial coats.—B.M.J.E. ii./04,43.

Trunecek's Serum has a freezing point—3.29° C. and an osmotic pressure 5·875 times greater than blood serum—*i.e.*, it is strongly hypertonic.

Cheron's Serum.—Sodium Chloride 2, Phenol 1, Sodium Phosphate (Na_2HPO_4, wrongly called Neutral Phosphate in France) 4, Sodium Sulphate 8, Distilled Water to 100.

Gelatin Saline and **Glucose Sterules** are described, pp. 435, 438.

Gum Acacia with Sodium Chloride for intravenous injection, to replace blood lost by hæmorrhage, see p. 1.

Hayem's Solution. Sodium Chloride 5, Sodium Sulphate 10, Water 1,000. Sterilise. This must be distinguished from Hayem's Blood Examination Fluid.

Regenerative Tablets.

Dose.—6 Tablets daily, 2 at each meal. The mixed inorganic Salts of the normal blood, each Tablet containing Sodium Sulphate 0·04, Chloride 0·4, Carbonate 0·016, and Phosphate 0·012 Gm., with Magnesium Phosphate 0·016 and Calcium Glycerophosphate 0·012 Gm. Useful in the treatment of arteriosclerosis. Thought to exercise a reviving stimulating action upon the vessels and circulation—preferable to the customary Iodine treatment, as they are free from the lowering effect of that substance. High rectal injections of a solution of 10 Tablets to the pint of water (approximating normal artificial serum solution) have been practised. This method has proved of value in heat collapse, weakness from vomiting of alcoholism and pregnancy.

Solubes Sodium Chloride Compound.

Sodium Chloride 40 grains, Potassium Chloride 2 grains, Calcium Chloride 1·3 grains.

Dose.—Two to the pint to make a slightly Hypertonic Solution; 4 make an approximately double normal strength Solution suitable for rectal injection.

In cholera (the collapse stage) and diarrhœa. Hypertonic Intravenous Injections of this Saline Solution, in addition give Calcium Permanganate *Drink* ½ to 2 grains increased up to 6 grains to the pint and *Pills* (Salol coated) of 2 grains.

The high temperature in the reaction stage of cholera should be controlled by cold sponging and iced water rectal injections. Though the surface temperature may be normal the rectal temperature may be anything up to 106° F. Prevention of uræmia will be effected by diluting the blood to at least the normal point by isotonic salines, by use of blood pressure raising drugs such as Digitalin, Strophanthin, Caffeine, and the vaso-constrictors, Adrenalin, etc.

Two **Calcium Permanganate Pills** are to be given every ½ hour for the first 3 hours and then every hour until the stools become green and less copious —which usually occurs within about 12 hours.

The permanganate being given in large amount *per os* destroys toxins in the bowel by oxidation. Sodium Bicarbonate intravenously to rectify the almost constant reduction in the alkalinity of the blood in all stages of the disease; as much as 320 grains given. The amounts varied from 160 to 1,120 grains in those cases which recovered while in five successful cases 800 or more grains were injected before free secretion of urine was obtained. —Sir L. Rogers, L. ii./15,219.

Sea Water. *Syn.* ISOTONIC PLASMA.—The injection of Sea water specially collected, diluted (isotonised) and *sterilised*, has been advocated for the diarrhœa of infants, as also eczema and digestive disorders and their sequelæ of adults have been well treated. The treatment has also been tried in psoriasis, syphilis, lupus, arthritis, ardenitis and tuberculosis, and is practically identical with the recognised Saline Transfusion methods for treatment of shock.

Dose.—20 to 100 Cc. (⅔ to 3½ ounces) every two or three days, increased as required.

For *infants*. *Dose* 10 to 30 Cc. under the skin of the scapula every two or three days, increasing if necessary.

Site of Injection.—For adults the injection is made behind the great trochanter,—the needle being inserted deeply. The diluted sea water is allowed to flow in by gravitation in the usual way.

Artificial Sea Water.—The following has been advised for injection as enema :—

Sodium Chloride 27, Magnesium Chloride 3, Potassium Chloride 1, Magnesium Sulphate 1¾, Calcium Sulphate 1, Distilled Water to 1,000.

Enema Sodii Chloridi, N.E.H.

Sodium Chloride ½ ounce, Hot Water 10 ounces. Use from 1 to 6 ounces for children according to age.

Dechlorination or Salt-free Diet.

In nephritis this has been successful (in many forms of nephritis the kidneys fail to eliminate salt). Copious diuresis sets in, œdema disappears and remains more or less absent so long as the treatment is kept up. Food should be cooked without it. The salt-free diet is, however, often disappointing. It should be tried where heart and lungs are hampered by excessive œdema, and in migraine and chlorosis. The theory of salt retention does not, however, wholly explain œdema following gastro-enteritis in children nor all cases of œdema in Bright's disease.

Epilepsy treated by Sodium Chloride reduction.—Reduce the salt in the diet and the absorption of Bromide will increase. The combined treatment, *e.g.*, with Bromide Tablets containing 2 grains of Salt and 18 grains of Bromide to be used to salt broth, satisfactory.—L. ii./12,918.

Baths of Common Salt (or Tidman's Sea Salt), about 2 pounds to each bath, act as a tonic and stimulant, *e.g.*, in chronic rheumatism.

Sal Marinum Artificiale.—Potassium Iodide 1, Potassium Bromide 1, Calcium Chloride 40, Magnesium Sulphate 200, Bay Salt 760.—Ph. Notes.

***Cerebos** (T.M. 227704) **Salt.**

Sodium Chloride with 4% of phosphates, mostly Calcium Phosphate, less deliquescent than 'Salt.' Is intended to replace the phosphates removed in the preparation of food.

Digestive Salt *Syn.* *****PEPSALIA. (T.M. 90722).

This consists of Sodium Chloride and Pepsin.

Pulvis Sodii Chloridi Compositus.

Sodium Chloride 6, Potassium Chlorate 1, Alum 1, Boric Acid 1, Borax 6. A saltspoonful in a half tumbler of warm water as a gargle is very beneficial for inflamed conditions of the throat.

Unguentum Sodii Chloridi. K.C.H., St. Bart's. H. UNGUENTUM SALVAS R.V.I.

Sodium Chloride and Soft Paraffin, equal parts. R.N.H. has Sodium Chloride 1, Sodium Bicarbonate 1, Soft Paraffin to 4.

Ringworm (of hairy regions). Croton Oil treatment is painful. Use this Ointment instead. Rub in daily, after bathing the head with very hot water. Even more painful than the former.—A. Whitfield, L. i./23,1124.

Sodii Bromidum. NaBr = 102·92.

Dose.—5 to 30 grains (**0.3 to 2 Gm.**). Slipule No. 0 holds 10 grains.

Tablets, 5 grains (**0·3 Gm.**). *Dose.*—1 to 6.

In slightly deliquescent granular white crystals, tasting like common salt; soluble 8 in 9 of water.

Flavoring.—Syl Menthæ Piperitæ, Glyl Coriandri; Syrupus Aromaticus (double dose), Syrupus Zingiberis.

Uses.—In epilepsy, insomnia, maniacal attacks, and hysteria. Full doses combat morphine habit.

A mixture of bromides in the proportion of sodium bromide 2, potassium bromide 2, and ammonium bromide 1, is said to have a better action than one salt alone.

It is used as substitute for the salt in the 'saltless' ('hypochloridization') treatment of epilepsy. (*See also* Sodium Phosphate.) The theory is that diminishing the chloride increases the readiness with which bromide enters the blood stream and nerve elements. *cf.* Dechlorination, p. 745.

The addition of 20 drops of Sal Volatile, or 5 drops of Fowler's Solution to the treatment prevents the rash which often disfigures patients taking Bromide.

DELIRIUM TREMENS in America treated by subdural injection of 1% Sodium Bromide Solution after removing 50 or 60 Cc. of cerebro-spinal fluid. Delirium controlled.—Boston Med. & Surg. Jl., Oct. 30, 1913; L. ii./13,1562.

Intrathecal injection of Sodium Bromide recently tried in TABES: 1% solution used. In spastic patients, 1·6% (isotonic with body fluids.) 10 Cc. of cerebro-spinal fluid removed and the same quantity of solution introduced. —L. i./23,607.

Sal Bromatum Effervescens.

Dose.—60 to 120 grains (**4 to 8 Gm.**).

Potassium Bromide 400, Sodium Bromide 400, Ammonium Bromide 200, Sodium Bicarbonate 1,000, Citric Acid 380, Tartaric Acid 445, Sugar 175, all in powder, separately dried and sifted. Mix in above order, and granulate with Spirit.

Sodii Bicarbonas. $NaHCO_3 = 84{\cdot}013$.

Dose.—5 to 30 grains (**0·3 to 2·0 Gm.**).

Occurs in small white crystals or powder. ***Soluble*** 1 in 11 of water; 20 parts are neutralised by 17 of Citric or 18 of Tartaric Acid. Is largely employed in dyspepsia and is of value in diabetes. A little rubbed on to the gum or placed in the cavity of a tooth, stops toothache. Large doses very useful in infantile vomiting; to neutralise the acid intoxication in these cases 100 grains are given when attack threatens, or smaller doses, *e.g.*, 10–15 grains every hour on premonition or attack commencing.

Incompatible with acids and acid salts, and with metallic and alkaloidal salts.

Bismuth, Magnesium and Lithium Benzoates and Salicylates are incompatible with Sodium Bicarbonate. It is also entirely incompatible with Aspirin. Acetates of Lead and Zinc liberate CO_2 from it; Diamorphine and Diacetyl Tannin do so also in small quantity. Use equivalent of Carbonate in dispensing, except in case of Aspirin.—P.J. i./17,9,257.

Flavoring.—Syl Lavandulæ, Syl Amygdalæ Amaræ; Syrupus Aurantii, Elixir Simplex.

For dyspeptic complaints, gout, rheumatism, etc., often prescribed, but discretion necessary. Often valuable in suppression of urine.—Eustace Smith. It is also of value in gastric ulcer.

Diabetic coma treated by intravenous injection of 1 litre of 3 to 5% solution slowly (in ¼ to ½ hour). **Isotonic Sodium Bicarbonate Solution** for this purpose is 1·35 Gm. with water *q.s.* to 100 Cc.

In a normal person 2 drachms of Sodium Bicarbonate *per os* will usually render the urine alkaline in 24 hours. In chronic nephritis the effect is produced by the same dose, but in pregnancy toxæmia a larger dose is required. —L. i./13,1366.

In influenza, Sodium Bicarbonate, 20 to 30 grains four times hourly, relieves abdominal pain and distension, and probably inhibits growth of the streptococcus and neutralises its toxin, the organism being in the bowel.—H. O. Butler, L. i./22,198.

Collutorium Alkalinum Compositum, (was in **R.D.H.**)

Sodium Bicarbonate 15 grains, Sodium Chloride 10 grains, Sodium Salicylate 1 grain, Thymol, Menthol, ¼ grain each, Glycerin of Borax 1 drachm, Thymol Solution to 1 ounce. One part to be used in 4 of water.

For post-nasal catarrh.—Pr., Apl., '09,529.

Nebula Alkalina, T.H. Sodium Bicarbonate 15 grains, Borax 15 grains, Carbolic Acid 4 grains, Glycerin 45 minims, Water 1 ounce. **Dobell's Solution** is approx. half this strength. **Nebula Sodii Bicarbonatis C.L.T.E.** Sodium Bicarbonate 20 grains, Glycerin 1 drachm, Water to 1 ounce.

Bain dit de Vichy. Fr. Cx.

Sodium Bicarbonate 500 Gm. dissolve in the bath at time of use.

Sodii Carbonas. $Na_2CO_3,10H_2O=286{\cdot}165$.

Dose.—5 to 30 grains (**0·3 to 2·0 Gm.**).

Is prepared from Sodium Chloride either by (the Solvay or Ammonia process) interaction with Ammonium Bicarbonate and subsequent ignition (Sodium Bicarbonate is an intermediate product), or by converting it into Sodium Sulphate and the action of heat on a mixture of the Sulphate with Carbon and Calcium Carbonate (Leblanc process). It is soluble in less than 2 of water and effloresces in the air. Internally in gout and skin diseases and for 'acidity.' A **lotion**, 2 grains to the ounce, relieves eczema. 1% is used as mouth wash or nasal douche. Instruments are boiled in a 1% solution to sterilise and to prevent rusting.

Exposure of sodium carbonate to moist air results in its gradual transformation to the hydrogen carbonate. (15—20% in 13 days.)—J.C.S.A. ii. 1921, 639.

In diabetic coma the intravenous injection of 30 ounces of 3 to 4% solution affords best chance of restoring patient, but the Bicarbonate would seem preferable. A 5% solution has caused death.

For ringworm melt the end of a piece of ordinary washing soda the size of a walnut by holding against a red hot poker, and rub freely into the affected part (hair cut off if necessary). Practically painless and stated to be infallible. Apply Boric Ointment if necessary.—B.M.J. i./13,498.

Sodii Carbonas Exsiccatus.

Approximately 107 of the exsiccated salt are obtained from 284 of the crystals. The salt is seldom used internally as such.

Sodii Carbonas Monohydratus. *Syn.* **Sodii Sesquicarbonas** U.S. $Na_2CO_3H_2O = 124{\cdot}021$, is known in commerce as **Concentrated "Crystal Soda,"** and used as a Bath Salt—water softener. It occurs in small silky crystals.

Sodii Chloras, Sodium Chlorate. $NaClO_3=106{\cdot}46$.

Dose.—10 to 30 grains (**0·6 to 2 Gm.**).

Caution.—Not to be rubbed with combustible substances. Colourless crystals with saline taste, soluble 1 in less than 2 parts of water, and 1 in 34 of 90% alcohol. Useful in diphtheria, stomatitis, sore throat, and in urethritis.

Tablets of Sodium Chlorate and Borax, 5 grains. Useful in loss of voice and relaxed throat.

Trochisci Sodii Chloratis, 3 grains in each (**0·2 Gm.**).

Made with black currant paste, and with plain sugar. More palatable than potassium chlorate.

Gargarisma Chlori. *Syn.* EUCHLORINE GARGLE.

Mix in a pint bottle Sodium Chlorate in powder, 10 grains (with Hydrochloric Acid, 30 minims) and let the gas generate and replace the air in the bottle, then cork the bottle, and let it stand for two minutes; lastly add gradually shaking after each addition, Distilled Water to 1 pint. This is a good antiseptic, *cf. Vol. II.*

According to the hypothesis that $4NaClO_3$ (= 4 × 105·71) are decomposed by 12 HCl (= 12 × 36·19) yielding 12 Cl (= 12 × 35·19) (in part ? as ClO_2), this gargle contains about 10 grains of Chlorine, in other words it is about 0·125% Chlorine.

Useful to remove follicular patches, *e.g.*, in diphtheria 2 or 3 ounces in a quart jug may be used as an inhalation (cold).

If salivation shows itself in Mercurial treatment of syphilis, Sodium Chlorate or Potassium Chlorate mouth-wash or Sodium Chlorate internally 10 to 20 grains best.—W. Knowsley Sibley, Pres., Mar./21,162.

Poisoning by Chlorine.—Treatment will be found under Poisons at end of this volume—under paragraph *Gas.*

Sodii Citras. $2C_3H_4(OH)(COONa)_3 + 11H_2O = 714·316$.

Dose.—10 to 60 grains (**0·6 to 4 Gm.**). Granular crystals or powder.

Solubility—1 in 3 of water. Is given as a cooling saline in preference to Potassium Citrate.

Sodium Citrate with $2H_2O$, in small crystals which are perfectly dry and remain stable, is now the article of commerce. This is official in U.S. IX 5 parts of this = 6 parts of the powder with $5\frac{1}{2}H_2O$ as above.—C. A. Hill P.J. i./23,153.

Flavoring.—Glyl Aurantii Amari, Syl Vanillæ.

Intravenously Sodium Citrate gives rise to acute toxic symptoms. Fatal dose ranges from 0·4 to 1·6 Gm. per kilo body weight. Hypodermically may also be toxic—experiments on rabbits.—Salant & Wise, Jl. Biol. Chem. J.C.S. 1917, 112 (1), 106; P.J. i./17,275.

Sodium Citrate Tablets.—5 and 10 grains.

These are used for infant feeding—(1) For weaning the healthy infant; (2) for increasing the amount of milk taken in the 24 hours; (3) for correcting milk dyspepsia (prevents formation of large clots); (4) for the avoidance of scurvy.

In the case of a child 4 months old commence with proportion of 1 grain to the ounce of milk, increase to 3 grains if necessary.—Sir James Barr recommends the addition of double the amount of Sodium Bicarbonate.

The Citrate is thought to influence the clotting of milk by precipitating the bulk of the Lime Salts. Some claim however, that the Citrate redissolves the precipitated Salts. **For Hospital Patients** prescribe 2 grains to each ounce of milk (first brought to the boil). If 4 ounces of milk are given every 3 hours 8 *grains in* 1 *drachm of water* may be ordered (others advise 1 grain only to each ounce).

In eczema and other 'lithæmic' conditions large doses found valuable. Migraine and inveterate neuralgia in gouty adults have been treated.—B.M.J ii./11,493.

In Bright's disease many patients do well on a pure milk diet (2½ to 3 pints slightly diluted) and Sodium Citrate added with advantage, but several difficulties arise in use of milk for nephritis.—Pr., Aug. 09/157.

Glaucoma treated by subconjunctival injection of solution 4·05 to 5·41% strength.—L. i./12,226.

In pneumonia 30 to 40 grains every two hours it is stated will cause rapid lysis.

Venous thrombosis as occurring in enteric treated by intravenous injections (up to ½ pint) of 0·5% Sodium Citrate—good results.—H. F. Marris, B.M.J. ii/17,822.

Hæmorrhage in jaundice prevented by injection of 30 Cc. of 30% Aqueous Solution, 15 Cc. intramuscularly into each buttock.—M.P.C., Nov. 29/22,446.

Malaria, amœbic hepatitis and relapsing fever treated with salts of organic acids, *e.g.*, citrates, tartrates or acetates. Suitable base, *e.g.*, Ammonium: stimulant, Sodium; non-toxic, to be taken into consideration. Their use advocated in practically all diseases due to protozoal parasites.—S. L. Rodrigues, M.P.C., Jan. 17/23,50.

Wright's Solution.—Sodium Chloride 4, Sodium Citrate 1, Water 120. For sinus washing.—Pye's Surg. Handicraft.

Liquor Sodii Ethylatis (B.P., 1898).

Is prepared by dissolving Sodium 1, in Absolute Alcohol 20, keeping the latter cool by a stream of cold water; has Sp. Gr. 0·867, and contains 18% of C_2H_5ONa. Rapidly becomes brown.

Uses.—Effective caustic for nævi and moles and lupus; also in hypertrichosis. Applied with a glass rod for 2 or 3 successive days. No water should be allowed to touch the part.

Liquor Sodii Methylatis.

Is prepared on lines similar to the above, employing Methyl instead of Ethyl Alcohol. It is available containing 2, 5 and 10% of Sodium Methylate.

Sodii Ethylas in *dry* form is to be stored in sealed tubes.

Sodii Hydroxidum. Soda Caustica. NaOH=40·008.

Dose.—½ to 1 grain (**0·03 to 0·06 Gm.**) well diluted.

In coarse white powder, fused masses, or moulded sticks.

Sodii Iodidum. NaI=149·92.

Dose.—5 to 20 grains (**0·3 to 1·2 Gm.**).

A white crystalline deliquescent powder, ***soluble*** 3 in 2 of water and 1 in 3 of alcohol 90%. Must be distinguished from the hydrous salt containing $2H_2O$, which crystallises from cold solutions.

Flavoring.—Glyl Amygdalæ Amaræ, Syl Cinnamomi.

Uses similar to those of the potassium salt *q.v.*

Incompatible with Bismuth Salts, Ferric Salts, Strychnine, Spirit of Nitrous Ether (unless made alkaline and with Quinine Sulphate)—*cf.* Potassium Iodide.

In aneurism Sodium Iodide is useful.—Tirard, Med. Treatment.

Mediastinal growths. Sodium Iodide 2 or 3 grains with 5 to 7 grains of Chloral every 3, 4 or 6 hours relieves the dyspnœa. The Iodide may have some effect in causing absorption,—not of the tumour, but of the adventitious materials about it, while the Chloral acts as sedative and antispasmodic.—Pr., May, 1911, p. 605.

In the routine treatment of chronic rheumatism, full doses of Sodium Iodide with Guaiacum give, perhaps, best results.—Whitla, Pract. Med.

Goitre is thought to be due to LACK OF iodine in food or water. At Rochester, New York, 20 parts of Iodine in the form of Sodium Iodide has been added to every billion parts of tap water twice a year for two weeks in the hope of supplying to the human system and the thyroid gland the needed element to prevent goitre in young children. It has been suggested to use sea water in place of common salt. See also **Potassium Iodide,** p. 699 and p. 895.

In ASTHMA, 1 to 2 Gm. in 10 to 20 Cc. of water has been advocated *intravenously.*—B. R. Lœwy, Am. Jl. of Clin. Med., May 1921.

℞ **Mistura Sodii Iodidi Composita.**

Dose.—1 drachm (**4 Cc.**) thrice daily for an adult.

Sodium Iodide ½ drachm, Sodium Benzoate 3 drachms, Arsenical Solution ½ drachm, Tincture of Pulsatilla 1 drachm, Tincture of Baptisia 3 drachms, Syrup of Orange 1 ounce, Chloroform Water to 8 ounces.

In tuberculosis of every variety J. Laird has found this mixture of great service. Calcium Salts in large quantities also essential, and in surgical cases lint moistened with a solution of Tincture of Iodine and covered with oil-silk to be applied.—'Notes on the Treatment of Tuberculosis: Preventive and Curative.'

Sodii Nitras. $NaNO_3$=85·008. *Dose.*—5 to 15 grains (**0·3 to 1 Gm.**).

Saline, refrigerant, diuretic.

Sodii Nitris, $NaNO_2$=69·008.

Dose.—1 to 2 grains (**0·06 to 0·12 Gm.**).

Is obtained by reduction of Sodium Nitrate by fusing it with lead.

In white, deliquescent, crystalline granules, or in sticks, with a cooling saline taste, soluble 2 in 3 of water; useful in angina pectoris and in epileptiform convulsions,—action similar to nitrite of amyl.

Compressed Tablets 2½ grains each, are prepared.

For asthma 3 to 5 grains frequently repeated; specially useful with hyoscyamus.—L. i./90,240.

"Sterules," Hypodermic, 1 Cc. containing ⅙ grain (**0·01 Gm.**). ⅓ grain (**0·02 Gm.**), and ¾ grain (**0·05 Gm.**) are prepared.

Even ⅛ grain distinctly affects the circulation, yet large doses do not cause death.—D. J. Leach.

The modern treatment of high tension by nitrites had been recommended in the time of Queen Elizabeth—nitre and blood-letting were advocated to prolong life—the nitre contained nitrites.

In granular kidney valuable. High tension of the pulse is natural to the disease. For urgent symptoms.—L. ii./08,519.

Raised arterial tension when dangerous, well treated by ½ grain doses, gradually increased to 4 or 5 grains.—Brunton.

See also **Pulvis Potassii Nitritis Compositus** and **Pulvis Sodii Nitritis Compositus.**

Tablets of Sodium Nitrite ½ grain, with **Sodium Iodide** 3 grains, also prepared 1 grain with 5 grains. To ward off attacks of asthma 1 every 2 or 3 hours. In attacks of paroxysmal pain, in aortic insufficiency Sodium Nitrite 2 grains with Sodium Iodide 3 grains thrice daily afford great temporary relief.—Yeo.

Tabellæ Sodii Nitritis Compositæ (*G. Oliver*).

Dose.—One or more as required.

Sodium Nitrite ½ grain, Erythrol Nitrate ⅛ grain, Mannitol Nitrate ¼ grain, Ammonium Hippurate 1 grain.

A combination of the slowly acting vasodilators of some promise.—G. Oliver, Studies in Blood-Pressure.

Poisoning of an infant by taking 3½ grains Sodium Nitrite misread for Sodium Citrate, L. ii./17,162.

Sodii Phosphis.—$Na_2HPO_3+5H_2O$=216·128, white crystalline powder soluble in water.

Sodii Phosphas Neutralis. *Syn.* Tribasic Sodium Phosphate. $Na_3PO_4+12H_2O$=380·232.

Used for softening water and for boilers, preventing incrustation.

Soluble in water with alkaline reaction, dissociation giving Sodium Hydrate.

Sodii Phosphas. *Syn.* HYDROGEN DI-SODIC PHOSPHATE; TASTELESS PURGING SALT. Na_2HPO_4, $12H_2O = 358{\cdot}24$.

Dose.—$\frac{1}{4}$ to $\frac{1}{2}$ ounce (**8 to 15 Gm.**) or 30 to 120 grains (**2 to 8 Gm.**) repeated. Colourless crystals or white granules.

Soluble 1 in 7 of water, is very efflorescent, loses 63% of its weight when heated to dull redness. Has an alkaline reaction.

Flavoring.—It is practically tasteless.

A mild aperient, well suited for a delicate stomach; small doses antacid and diuretic, useful in bilious sick-headache and jaundice.

For hepatic calculi, 60 grains 3 times a day, with $\frac{1}{20}$ grain sodium arsenate added, is given if any evidences of gastric intestinal catarrh.

Fireproofing.—Fairly concentrated solutions of sodium phosphate, ammonium phosphate, sal ammoniac, or sodium tungstate (20%) are all useful.

Sodii Phosphas Effervescens. (**Martindale**).

Dose.—1 to 3 drachms (**4 to 12 Gm.**).

A convenient and pleasant mode of taking this useful purgative. Introduced by W. Martindale, and now made Official.

In exophthalmic goitre and neurasthenia of value.

As nervine tonic in stomach dilatation—must be persevered with.

Vescettes ' of Sodium Phosphate. 30 grains.

Dose.—1 to 6 crushed and taken in a draught of warm water.

Sodii Phosphas Exsiccatus. $Na_2HPO_4 = 142{\cdot}048$.

Dose.—10 grains to 4 drachms in some warm liquid.

Sodii et Ammonii Phosphas. *Syn.* MICROCOSMIC SALT.

$Na(NH_4)\,HPO_4 + 4H_2O = 209{\cdot}152$. Used in chemical analysis with blowpipe and for estimation of Magnesium.

Sodii Phosphas Acidus (*Off*). **Dihydrogen Sodium Phosphate** $NaH_2PO_4 + H_2O = 138{\cdot}072$.

Dose.—30 to 60 grains (**2 to 4 Gm.**).

Crystals soluble about 1 in 1 of water, and 1 in 300 of alcohol 90%. The *Off.* Salt is 70% pure. Has been given in alkalinity of urine with good results. Particularly useful in cystitis, and after operations on the bladder to keep the urine acid. If diarrhœa occurs, stop its use for a time. *cf.* **Hexamine.**

Passage of a calcium oxalate stone may be assisted by employing this salt owing to its solvent action on calcium oxalate. The salt given by the mouth is eliminated as such. Two ounces per diem in 100 ounces of distilled water were administered, and in six weeks no symptoms of stone remained, yet no calculus was passed—the stone was dissolved. The solvent action can be demonstrated *in vitro*. The same treatment is advised in cases of Calcium Oxalate deposit without stone formation,—should be given from time to time to prevent concretion.—B.M.J. ii./09,1347.—P.R.S.M.Med. Sect., 1909, p. 1 *et seq.*

Given by the mouth will convert an alkaline urine into an acid one or increase acidity if already so. Acidity excepting in case of *B. Coli*, and *Staphylococcus* means lessened bacterial growth.—P.J. ii./11,16.

Mistura Sodii Acid-Phosphatis L.H.

Dose.—$\frac{1}{2}$ ounce (15 Cc.).

Sodium Acid Phosphate 30 grains, Red Mixture $\frac{1}{2}$ ounce (Mistura Rubra L.H. Fuchsin $\frac{1}{1000}$ grain, Water $\frac{1}{2}$ ounce).

Mistura Sodii Acid-Phosphatis Composita L.H.
With each dose of the previous, patient to take Hexamine 5 grains.

Mistura Antiseptica. Liverpool Royal Infirmary Pharm. (1922).
Dose.—Half ounce, well diluted with water.
Sodium Acid Phosphate 20 grains, Hexamine 10 grains, Syrup 20 minims, Water to half ounce.

Sodii Sesquiphosphas. $Na_3H_3P_2O_8=262{\cdot}104$.
Average dose.—30 grains (**2 Gm.**) *pro die* in divided doses.
This salt may be considered as a combination of equimolecular proportions of the Ortho-phosphates,—Na_2HPO_4 and NaH_2PO_4. It is virtually neutral to both blue and red litmus. It distinguishes itself as an Ortho-phosphate Compound by not coagulating Albumin, and by yielding a yellow precipitate with Silver Nitrate Solution. ***Soluble*** with ease in water.

Joulie employs this salt where the 'Ratio of Phosphoric Acid' is deficient and the 'Ratio of Acidity' is normal. It is not at all objectionable to the taste. Hyper-acidity will rapidly yield to the ordinary Sodium Phosphate *e.g.*, in the form of Effervescent Sodium Phosphate, *q.v.* *See also Vol. II.*

Sodium Silicate, Solution of. *Syn.* SOLUBLE GLASS, Water Glass. $Na_2SiO_3=122{\cdot}10$ (+Aq.)
A viscid solution, of the consistency of treacle, usually containing 10% of caustic soda and 20% of silica. That of P.G.V. has Sp. Gr. 1·3 to 1·4. The solution will arrest the putrefaction of organic matter. In powder form this silicate is used medicinally in France, but both it and Silica *vide infra* would appear to be unsuitable chemicals for use *per os*.

Silica (Silicic Acid). Pills containing 1 grain with Morphine ⅛ grain also lozenges containing 1 grain with Sugar basis in cancer.—Battye. Edin. Med. Jl., 1874,420; Pres., 1912,298.

Potassium Silicate, Solution of. Variable amounts of $K_2SiO_3=154{\cdot}40$ and $SiO_2=60{\cdot}1$ *Syn.* SOLUBLE GLASS.
Is less viscid than the Sodium compound and is also used to impregnate bandages for treating fractures. This was the original preparation of the two.

Salufer. A mixture of Silicofluorides used in the moist treatment of wounds. There is no fear of absorption.

Silicosis. Calcium Chloride and hydrated soluble Silica—two common constituents of the soil—have the property that, when either of them is injected with tetanus spores under the skin of a mouse, they provide the necessary condition for the germination of the spores and the production of the disease. The presence of Silica in the lungs leads to fibrosis and predisposes to consumption. Wrapped up in this is the possibility of new light on the problem of consumption which is a scourge of tin miners, gold miners, etc.—H. H. Dale, L. ii./21,112.

Silicosis and tuberculosis of lung. Phthisis found to be specially prevalent in the boot and shoe trade. The general conclusion is that Silica has no influence on the high phthisis rate found in this and in the printing trades.—R. Pratt, L. i./22,761.

Dust inhalation and pulmonary disease. Diminution of chest expansion occurs amongst workers exposed to silica dust. 7·07% of wet sandstone hand-grinders (with their special exposure to silica dust) gave definite evidence of tuberculosis. Results of examination of 1153 workers.—L. ii./23,470.

Glass for Technical Purposes. *The British Science Guild* issued a Report regarding manufacture of Optical instruments. The *Glass Research Committee* of the Institute of Chemistry provides formulas for laboratory glassware. Valuable formulæ for soft glass, resistant glass, combustion tubing glass (=Jena), miners' lamp glass, soft soda glass for tubing and X-ray bulbs, etc., are provided.—C. D. Apl. 24, 15, p. 534.

Sodii Persulphas, Sodium Persulphate.
$Na_2S_2O_8 = 238{\cdot}12$.

Dose.—1 to 3 grains in water before meals.

In small white granular crystals, soluble in water. In tuberculosis and chlorotic and neuropathic subjects stimulates appetite. Useful in hyper-acid dyspepsia at the onset, also in gastric cancer. A strong oxidising and bleaching agent.

Liberates about 13% active oxygen. If it is desired to avoid production of free sulphuric acid, the persulphate may be mixed with 1¼ times its weight of Sodium Carbonate. 3 to 10% solutions as gargle and dressing. Suitable for wounds requiring moist dressing and where disinfection necessary. For small ulcers may be used as dusting powder, with equal quantity of powdered talc. Odourless and non-toxic.

Tetanus treated by intravenous injection of fresh 5% Sodium Persulphate solution given—60 Cc. each day—preferably in 2 or more doses injected slowly, the injection taking some 5 minutes. A reaction often appears—nausea and vomiting for ½ hour. Three cases with good effect.—L. i./18,188.

For Ammonium and Potassium Persulphates, see Vol. II.

Sodii Sulphas Acidus. $NaHSO_4 + H_2O = 138{\cdot}084$. *Syn.* Sodium Bisulphate.

In crystals or in fused masses, is recommended to purify water which may have typhoid contamination ; 15 grains to a pint of water destroys *B. typhosus* after 15 minutes contact, as also *B. enteritidis, Spirillum choleræ* and internal parasitic worms.

This fact was originally determined by S. Rideal and a patent was taken out by him for the process. We ourselves have frequently verified the activity of a solution of this kind on water infected with *B. typhosus*.

'Anti-Typhoid' Tablets (originally patented by S. Rideal), containing the equivalent of 7½ grains of active Sodium Bisulphate are prepared, to dissolve in ½ pint of water.

They are effervescent and yield a slightly acid, refreshing and thirst-quenching drink. They should also be used for washing food, *e.g.*, Salads. They were employed in the South African and in the Russo-Japanese wars with success. Used by the Territorials, in forced marches not exceeding 3 days useful. After a few days' use it acts as a purge.

Nauheim Bath Salts are prepared with this Salt and Sodium Bicarbonate. The Nauheim Water contains in addition Sodium and Calcium Chlorides, *cf.* List of Mineral Waters.

Fused Sodium Bisulphate Tablets, 5 ounces and packets of Sodium Bicarbonate for making **Effervescing baths** patented by E. Sandow. Patent now expired.

In hydropathic establishments according to Ph. Form. baths are prepared extemporaneously with the following (each quantity for 40 gallons at 95° F.):

No.	Sodium Chloride.	Calcium Chloride.	Sodium Bicarbonate.	Hydrochloric Acid.
1	4 lbs.	6 ozs.	None.	None.
2	5 ,,	8 ,,	None.	None.
3	6 ,,	10 ,,	6 ,,	7 ozs.
4	7 ,,	10 ,,	8 ,,	9¼ ,,
5	9 ,,	11 ,,	1 lb.	18½ ,,
6	11 ,,	12 ,,	1½ ,,	27¾ ,,

Effervescing baths are believed by many to have a more marked effect in lowering blood pressure than ordinary water at similar temperature.—L i ./13,1467.

Sodii Sulphas. Glauber's Salt, $Na_2SO_4.10H_2O = 322{\cdot}22$.

Dose.—¼ to ½ ounce, or 30 to 120 grains repeated.

The form known as **Feathery Crystals'** is handy for dispensing. Soluble about 1 in 3 of water—also in Glycerin ; insoluble in Alcohol.

Flavoring.—Glyl Vanillæ, Glyl Menthæ Piperitæ.

In infantile diarrhœa acts as an antiseptic, as the diarrhœa disappears. The dose was insufficient to be aperient. About 6 grains initially for a baby under 6 months, increasing up to 1 drachm for adults every 6 hours in fennel water. Children over 6 months can take 10 to 20 grains without producing aperient action. The administration of saline laxatives simultaneously or previously delays the absorption of drugs, alkaloids etc.—Macht and Finesilver, L. ii./22,347.

Sodii Sulphas Exsiccatus. $Na_2SO_4.H_2O = 160{\cdot}076$.

Dose.—½ to 2 drachms (**2 to 8 Gm.**).

On drying, Sodium Sulphate Cryst. loses about half its weight.

Sodii Sulphas Effervescens.—*Martindale.*

Dose.—A teaspoonful or more in half a tumbler of water, taken half an hour before breakfast is an efficient evacuant.

Sodii Magnesii Sulphas Effervescens.—*Martindale.*

Dose.—A teaspoonful or more in half a tumbler of water taken half an hour before breakfast.

These aperients are palatable and convenient to use when travelling.

'Vescettes' of Sodio-Magnesium Sulphate. Each equivalent to 60 grains of the above, to be dissolved in a little warm water.

Sodium and Magnesium Sulphates are useful in clearing out the intestinal tract and lower the blood-pressure (in arteriosclerosis).

Sodii-Magnesii Sulphas Effervescens cum Caffeina.—*Martindale.*

Dose.—One teaspoonful or more.

A useful "pick-me-up," and for headaches.

'Vescettes' of this preparation contain 60 grains.

Chloro-Sodio-Magnesian Aperient.—*Martindale.*

Dose.—A teaspoonful or more.

An efficient saline purge, useful in migraine and other forms of headache; also in constipation, and for assisting digestion and relieving depression by increasing the action of the liver, intestines, and kidneys, and promoting free excretion of waste products.

The activity and palatability of the last five preparations may be increased, especially in winter, if taken in *warm water*. The combination of the salts of sodium and magnesium makes a more active purgative, but the effervescent sodium sulphate alone is more pleasant.

Sal Carolinum Factitium, P.G.V., Ph. Ned., Artificial Carlsbad Salt. *Dose.*—20 to 60 grains (**1·3 to 4 Gm.**) in warm water. Dried Sodium Sulphate 22, Potassium Sulphate 1; Sodium Chloride 9, Sodium Bicarbonate 18, all in fine powder. Mix. 53 grains to 1 pint of water is similar to Carlsbad Water.

Marienbad Salt is similar. **Marienbad Salt Tablets** may be prepared containing 60 grains of the mixture.

Marienbad Antiobesity Tablets. *Dose.*—One or two at bedtime. Aloes ½ grain, Rhubarb 1 grain, Cascara Extract ½ grain, Marienbad Salt ½ grain, Fucus Extract 1/6th grain.—P. J. F.

Note.—T.M.s ✱'Marienbader' No. 154288 and 154289 also 'Marienbader Tabletten' No. 242596 are on the Register.

'Vescettes' of Carlsbad Salts. Each equivalent to 2 ounces of Carlsbad-Sprudel Water.

Cavendish Water (*Martindale*).

Dose.—A wineglassful, diluted if preferred with a little warm water, ½ hour before breakfast.

Contains Sodium, Magnesium and Potassium Sulphates, also Sodium and Potassium Chlorides in a slightly effervescent Solution.

Aqua Dissocians.

Dose.—¼ of a glassful—diluted preferably with distilled water to a glassful—in the morning.

This water is not purgative. It depends for its action upon the property of chemical dissociation of the contained salts which include the Chlorides of Sodium, Potassium, Magnesium and Lithium, together with Sulphates of Magnesium and Calcium and a minute quantity of Sodium Bromide. It is slightly chalybeate and resembles chemically many mineral waters.

Sal Emsanum Facticium, Ph. Ned.

Sodium Sulphate Exsiccated 7, Potassium Sulphate 13, Sodium Chloride 325, Sodium Bicarbonate 655. **Sal Hunyadi Janos Facticium, Ph. Ned.** Desiccate Magnesium Sulphate 950 to 500, add Sodium Chloride 50, and Sodium Sulphate Exsiccated 450. **Sal Vichy Facticium, Ph. Ned.** Desiccate Sodium Phosphate 40 to 16, add Potassium Sulphate 50, Sodium Chloride 80, Sodium Bicarbonate 854.

Dose of each.—20 to 60 grains (**1·3 to 4 Gm.**), increased as required.

Sodii Sulphis. $Na_2SO_3,7H_2O=252{\cdot}172$.

Dose.—5 to 20 grains (**0·3 to 1·2 Gm.**).

Colourless efflorescent crystals (keep in stoppered bottles).

Soluble in water 1 in 2, in Glycerin 1 in 25; slightly in Alcohol 90%. Incompatible with acids. Antiseptic.

In dilatation of the stomach the late Sir Wm. Broadbent recommended as antiseptic treatment Sodium Sulphite 5 to 10 grain doses, with sodium bicarbonate and nux vomica between meals.

As a lotion for skin affections and sores of the mouth, and internally for *sarcinæ* in the stomach.

Sodii Sulphis Exsiccatus contains about 90% $Na_2SO_3=126{\cdot}03$.

Is used in photography. Being in dry powder is convenient for transit.

Sodii Sulphis Acidus. *Syn.* SODII BISULPHIS. $NaHSO_3=104{\cdot}068$.

Dose.—5 to 30 grains (**0·3 to 2 Gm.**).

White powder soluble 1 in 4 of water. Incompatible with acids. Has antiseptic properties. In stomatitis and skin affections.

Sodii Metabisulphis. *Syn.* SODIUM PYROSULPHITE. $Na_2SO_3SO_2=190{\cdot}12$. Made by passing Sulphur Dioxide into a hot concentrated aqueous solution of Sodium Sulphite.

Suggested Dose.—2 to 5 grains (**0·12 to 0·3 Gm.**).

Sodium Metabisulphite 20 grains, Alcohol 90% 1 ounce, Peppermint Oil 5 minims, Glycerin 2 ounces. Has been used as an antiseptic throat pigment. It is said to be a specific to kill yeast fungus in the intestines. In photographic use is similar to the Potash Salt, *q.v.*

Sodii Sulphidum, $Na_2S,9H_2O=240{\cdot}204$. Yellowish deliquescent crystals soluble in water. Employed in skin affections.

A 25 to 40% Aqueous Solution as depilatory.

In surgery a mixture of this, cold-water, starch and fine unslaked lime is used as a depilatory.—A. Don, L. ii./15,339.

Balneum Sulphuris Alkalinum (see also p. 772).

Sodium Sulphide 2 ounces, Sodium Chloride 2 ounces, Sodium Bicarbonate 1 ounce. To be added to 50 or 60 gallons of hot water.

Soda Tartarata. **Sodii et Potassii Tartras.** (*Off.*). ROCHELLE SALT, SEIGNETTE SALT. $(CHOH)_2.COONa.COOK+4H_2O=282{\cdot}216$.

Dose.—120 to 240 grains (**8 to 15 Gm.**). Colourless crystals.

Soluble 1 in 1½ of water.

Also in Alcohol 20% (Wt.) at 25° C. 1 in 2·82, 50% 1 in 40·7, 70% 1 in 332·4, 80% 1 in 1665.—Seidell.

Flavoring.—Syl Lavandulæ, Syl Rosæ; Syrupus Aurantii.

Pulvis Sodæ Tartaratæ Effervescens (*Off.*) *Syn.* **Seidlitz Powder.**

Sodium Potassium Tartrate, in dry powder, 120 grains. Sodium Bicarbonate, in dry powder, 40 grains, in the blue paper. Tartaric Acid, in dry powder, 40 grains, in the white paper. *Off.* now states approx. these figures in metric terms. 'EXTRA STRONG' (3 drachms Rochelle Salt) and '**Double Strength**' (4 drachms) are also supplied.

'**Alkaline**' **Seidlitz Powders** are made with additional 60 grains of Sodium Bicarbonate.

Seidlitz-powder in Italy is composed of magnesium sulphate 15, sodium bicarbonate 2, tartaric acid 2.—Ph. Notes.

Sodii Tartras (Neutrale). $(CHOH.COONa)_2\,2H_2O=230{\cdot}084$.

Dose.—As aperient ½ to 1 ounce. Diuretic, 15 to 60 grains repeated. White crystalline powder comparatively tasteless. Soluble in water 1 in 2. Relaxes the bowels and increases the flow of urine.

Sodii Sulphocyanidum. *Syn.* SODIUM RHODANIDE, SODIUM THIOCYANATE. $C:N.S.Na=81{\cdot}073$.

Dose.—1 to 5 grains (**0·06 to 0·3 Gm.**).

A crystalline colourless salt, soluble in water 1 in 0·3, and 1 in 0·6 of Alcohol 90%. It has a sedative action on the nervous system, is an analgesic and may be found useful in nervous affections, arterial sclerosis, and chronic nephritis.

Favourable effect on pains of tabetics and in angiospastic migraine has been reported.

Sodium, potassium and ammonium thiocyanates were tested on rabbits and other animals. No hydrocyanic acid was split off, and these salts did not act as poisons.—J.C.S.A. ii./12,668.

Sodii Taurocholas, $NaC_{26}H_{44}NSO_7=537{\cdot}55$.

Dose.—2 to 6 grains (**0·12 to 0·4 Gm.**), in pill, keratin-coated to prevent solution until it reaches the bowels. A whitish powder, prepared from pig's bile, ***soluble*** about 2 in 1 of water. It has been recommended for gouty obesity and dyspepsia.

Sodii Glycocholas. $NaC_{26}H_{42}NO_6=487{\cdot}474$.

Dose.—2 to 6 grains (**0·12 to 0·4 Gm.**).

A similar salt, soluble 1 in 2 of water and 1 in 3 of alcohol 90%, which appears to be a useful cholagogue for congestion of the liver, gallstones, constipation and melancholia.

These salts produce slight fall of blood pressure, the taurocholate more than the glycocholate.

Pediculosis. Bile Salts assist oily emulsions to penetrate shell of louse's egg. Sodium Taurocholate 10 Gm., Oleum Eucalypti 50 Cc., Water to 1,000. Solve the Taurocholate in water, add the oil and shake well. This emulsion is well rubbed into the head to wet the hair completely. Wrap in cap or towel. Wash with soap and water next morning, and a fine tooth comb to be used daily for a fortnight.—B. A. Peters.

Prophylactic in gonorrhœa. Bile Salts prevent growth in *vitro* (Castellani). A solution of Sodium Taurocholate 2 to 4 Gm. in Glycerin 30 Gm. to be applied to the meatus and over the glans before coitus.—Pres., Feb./21,77.

Infantile marasmus well treated by Bile Salts (increasing fat assimilation). Average dose ¼ grain of the mixed Sodium Glycocholate and Taurocholate for infants of three months.—E. F. Kerby, L. i./21,272.

Bile Salts have been used locally to the conjunctiva.

Cholalic Acid. *Syn.* ✱COLALIN. (T.M. 271422). CHOLIC ACID. $C_{24}H_{40}O_5=408{\cdot}42$.

An active constituent of bile in amorphous yellowish powder. ***Soluble*** in alkalis, particularly caustic potash, and in alcohol about 1 in 1; insoluble in acids, ether, and water.

Colalin Tablets ($\frac{1}{8}$ and $\frac{1}{2}$ grain in each. *Dose.*—One three times daily before food) also contain a little magnesium carbonate.

Uses.—Stimulate the liver and increase flow of bile. Has slight depressant action on heart. Soluble in the alkaline juice of the small intestine—not dissolved in the stomach. For biliousness, melancholia, recurrent sick-headache and intestinal indigestion.

Should the substance constipate due to the action the bile has on absorption of fats, **Colalin Laxative** should be administered. Colalin combined with the principles of Cascara. **Tablets contain** $1\frac{1}{8}$ grain each. *Dose.*—One thrice daily.

Desoxycholic Acid. $C_{24}H_{40}O_4$.

Manufacture. Obtained by reducing Cholic Acid (*Syn.* Cholalic Acid), $C_{24}H_4O_5$ with Zinc and Acetic Acid. W. Mair (Report from Research Laboratory Metropolitan Asylums Board, London), Biochemical Journal, Vol. XI., No. 1, May, 1917, digests Ox Bile with Soda and throws out the Bile Acids with Acetic Acid (after first freeing from Silica by a sufficiency of Hydrochloric Acid). The Bile Acids are recrystallised from Glacial Acetic Acid repeatedly, using also 60% Acetic Acid in the later stages. The method gets rid of Cholic Acid and other impurities yielding the Desoxycholic Acid practically pure with melting point 172° to 173° C. 4 litres of bile yield from 30 to 40 Gm. The acid can also be made from Commercial Sodium Taurocholate on similar lines—the yield being about 5%.

Sodium Desoxycholate.

Spray Solution.—Sodium Desoxycholate 4, Quinine Hydrochloride 0·5 Glycerin 25, Water to 100. For septic throats.

Tablets.—Contain Sodium Desoxycholate 1 grain, Quinine Ethyl Carbonate 1/8th grain, Peppermint Oil 1/20th minim, Ammoniated Glycyrrhizin 2 grains. Also made with Flavine 1 in 1,000. For infected throats.

Bile salts appear to possess a solvent action on pneumococci, also on amœbæ and spirochætes. Sodium Desoxycholate was found to be 10 times more powerful than Sodium Cholate or Sodium Taurocholate. The addition of quinine enhances the action.—F. M. Wells, B.M.J. ii./17,6.

ℙ1 SPARTEINÆ SULPHAS.

$C_{15}H_{26}N_2.H_2SO_4.5HO=422.455$ (water content varies). FR. CX. and **P. Jap.** III. (now omitted).

Dose.—$\frac{1}{4}$ to 1 grain (**0·016 to 0·06 Gm.**) increased.

FR. CX.—*Max. single dose* $\frac{3}{4}$ grain, max. during 24 hours 4 grains.

The sulphate of a volatile liquid alkaloid, $C_{15}H_{26}N_2=234{\cdot}329$, in colourless crystals. ***Soluble*** 3 in 2 of water, and about 1 in 6 of alcohol 90%. Obtained from the leaves and branches of Broom, *Cytisus scoparius*. This contains also a crystalline principle Scoparin.

Two new alkaloids found, one volatile like Sparteine, the other not.—A. Valeur, Compt. Rend. 1918, 167, 26, 162, Y.B.P. 1919, p. 10.

℗**Hypodermic Tablets** contain $\frac{1}{2}$ grain (**0·03 Gm.**).

℗**Pills** contain $\frac{1}{4}$ grain (**0·016 Gm.**).

Properties and Uses.—Sparteine possesses little digitalis action; it acts like conine, atropine, curarine and cocaine, but feebly. In its resemblance to conine it acts on the central nervous

system. Like atropine in paralyses the vagus nerve, but only in very large doses, and in these it paralyses the motor nerve endings so that in this respect it resembles curarine. It perhaps also paralyses the sensory nerves—when injected it anæsthetises like cocaine. —Gordon Sharp, P.J. i./16,348. Dr. Samuel Johnson passed 20 pints of urine in 24 hours after taking the infusion. In the past it has been given in morphine habit. In post-operative suppression of urine. *Large doses*—1 to 2 grains hypodermically every 3 to 6 hours—have been given.

℞ **Oxysparteina**, $C_{15}H_{24}N_2O$=248·283 is an oxidation product of Sparteine.

Has been stated also to act as a cardiac stimulant. The **Hydrochloride** and **Sulphate** are prepared.

Scoparin $C_{20}H_{20}O_{10}$, a neutral soluble phenol principle allied to the glucosides. *Dose.*—½ to 1 grain (**0·03 to 0·06 Gm.**). This other constituent of broom acts as a true diuretic on the kidney tissue proper, and it also acts as a diuretic in virtue of its digitalis-like action on the heart muscle.

Sparteine Periodide. $C_{15}H_{26}N_2.3I$=615·059.

Dose.—½ to 1 grain (**0·03 to 0·06 Gm.**), increased if necessary. We know of 3 grain doses having been given under a prescription.

When made by interaction of Sparteine and Iodine in suitable solvent (*cf.* Alkaloidal Periodides) this compound is obtained in black crystals containing 38% of Sparteine.

Pharmacology. On treatment with Physiological Acid, it is to a large extent split up (12·4% of the Periodide is liberated to this solution), while subsequent treatment with Physiological Alkali liberates only a small amount.

Doses of ¼ and ½ grain were taken by two of the author's assistants (S.L.W. and C.J.). No discomfort caused and no untoward symptoms observed.

Solubility.—Soluble in Chloroform, slightly soluble in Alcohol, insoluble in Ether and water.

Uses.—May prove of service as a new method of giving the active principle of Broom as diuretic.

Dispensing Note.—To be given alone, in cachet or 'slipule,' preferably after meals.

SPHAGNUM.

TURF MOSS or BOG MOSS.

Botanical.—There are numerous varieties of Sphagnum indigenous to Great Britain. Large tracts of it are found in Scotland, the English lakes, Dartmoor and in Ireland.

We are indebted to Mr. Holmes for the following notes on a mixture of Sphagnum sent to him for botanical diagnosis :—

The large concave leaved plant is *Sphagnum Cymbifolium*. *S. Papillosum* is only distinguishable under the microscope from it. *S. Cuspidatum* has long tapering branches and narrow tapering leaves and grows *in* water. *S. Acutifolium* is small, usually in compact tufts with small leaves of various tints. The other common species are mostly intermediate in character; *S. Contortum* like a small *Cymbifolium* with curved rather stiff branches, *S. Reflexum* with flat edged leaves and *S. Squarrosum* with leaves bent back.

The plant consists virtually of a large collection of delicate resilient capillary tubes or perforated cells having the effect of a very fine sponge. These cells readily take in water and hold it firmly—the water can be squeezed out without the cells collapsing—(this is the case even after the application of hydraulic pressure—W. H. M.).

In life the plant takes all its water from the atmosphere—it is not dependent on soil water.—Prof. I. Bayley Balfour, quoted by C. W. Cathcart, B.M.J. ii./15,137.

Chemical Examination.—An analysis by E. Treffner in 1881 of *S. Cuspidatum* showed it to contain 7·3% of substances soluble in water. Glucose is present to the extent of 3·05%, Saccharose 1·2% (—? W. H. M.), Chlorophyll 0·9%, Resin 0·7%, Albuminoid soluble in water 1·4%, Tannin and Mucilage traces, and Ash 1·9%. No evidence of Iodine.—P.J. i./16,125.

Uses.—For some years past the writer has advocated the use of dried sphagnum as *the* absorbent dressing *par excellence* for imbibing discharge of any description. It has no doubt been used for centuries by soldiers to staunch wounds in war. It was also brought into service by blast furnace workers as a protective against heat and as a dressing for burns. The plant in its dry condition will imbibe a large quantity of water or discharge—upwards of 20 times its weight. The variety *Cymbifolium* is thought to be the most efficacious in this direction, but there is probably not much difference between one variety and another. For taking up urinary discharge in bladder, kidney and dropsical affections the material is pre-eminently suitable. The dressing is also useful as a bedding for insane persons.

Colin Campbell, Manch. Med. Soc., 1891, was an ardent user of moss. He pointed out that :

When cotton wool is placed in contact with a liquid, the fluid seems at once to seize it, its bulk becomes *diminished*, and its surface wet, each fibre having become saturated with the moisture. Moss on the other hand seizes the liquid; its bulk becomes rapidly and enormously *increased*. The absorbed liquid does not lie on the surface or between the fibres, but is shut up within the capillary cells of the moss: Thus, though it is full of liquid, *it does not feel wet*, and though it may be full of pus, it appears clean.

One of the advantages of moss as an absorbent is that the discharge when absorbed by it *spreads—diffuses quickly in all directions* until the moss is all soaked, rendering it therefore more efficient as a dressing. Cotton wool has not this action—the absorption is relatively local—upwards from the discharging surface. Patients state that the dressing is cool while cotton dressings are not.

Moss dressings cheap, deodorant and antiputrescent ; hence they are invaluable as applications to foul ulcers or septic abscesses.

The dressing may be wrung out in antiseptic lotion equivalent to a 1% Lysol just prior to use, though a vast number of the moss dressings used in the war were not sterilised or treated with antiseptic in any way—and this in all probability without untoward infection of the wound.

Sublimated Moss contains 0.25% Mercuric Chloride (the proportion commonly used for sublimating cotton wool). The preparation of this involves soaking the dry moss in a sufficiency of Mercuric Chloride solution, pressing out excess and leaving in it enough of the solution to yield the stated proportion of sublimate on drying again. **Steam Sterilisation** is unsatisfactory. —C. W. Cathcart, L. i./16,820. Anyone conversant with the extraordinary absorptive and retentive power of moisture exhibited by sphagnum knows the process is, to say the least of it, laborious and expensive.

The writer has had experience in the preparation of Moss Dressings both in the compressed form, and as muslin covered bags of convenient size for the use of the dresser ; he started the industry in this country to compete with the German moss dressings :—

'Cavendish' Moss Sheets are of size 24 by 15 inches by $\frac{1}{8}$ inch approximately in thickness; two of these approximate 1 lb. in weight. They are handy for transit, a cwt. packing into a small case. In use the sheet is lightly broken up and teased out by the nurse and placed between folds of butter muslin or gauze. If desired, the entire dressing so made is rung out in antiseptic lotion —in many cases it will be satisfactory to slip the compressed dressing under the bed sheet as it is.

'Hallam' Moss. This is similar to the latter, the sheets, however, being more friable and thinner.

Gauze Covered Moss in the same size and sheet is also prepared ready for use.

Moss (Loose) **Dressings** in muslin bags size 12 by 8 inches, 10 by 6 inches, and 7 by 5 inches.

Moss Towels for menstruation are made, also **Moss Accouchement Sheets** 36 by 36 inches, and **Pillows** 18 by 18 inches.

Moss dressings are especially suitable for wounds suppurating freely. In such wounds the best results will be obtained when the moss is applied damp. A thin layer of gauze is wrung out of a warm antiseptic lotion and laid on the wound; over this, and overlapping it freely, are placed the damp bags of moss as required. After each bag has been wrung out of the warm lotion, the contained moss must be lightly opened out with the fingers; this is done easily owing to the elasticity of the material. Lastly, the bags are held comfortably in position with a bandage. This treatment of the moss-bags is recommended whether the dressings are in the loose or compressed form, and whether they have been sublimated or sterilised by steam.—C. W. Cathcart.

Sphagnum pads very useful, placed under wounds to collect excess of irrigant antiseptic in the Carrel-Dakin method.—B.M.J. ii./17,597.

* 'STERULES.'

(T.M. 260408)

'Sterules' are glass capsules of sterile solutions for inhalation, ophthalmic, hypodermic, intravenous, intramuscular, and ionic use. The **Ophthalmic Sterule** is inserted through an **Ejector**, and its 'breech' end is snapped off at the file mark. It is drawn further through the ejector, held horizontally, and the other end is broken off at the file mark. The 'breech' end of the ejector is now covered with the index finger, and the soft part is pressed with the thumb and second finger to release a small quantity (sufficient for one application in eye work) of a *sterile* solution. The file marks are situated $\frac{1}{4}$ inch from the ends of the 'sterule.'

Hypodermic Sterules are flask-shaped or with the two ends pointed.

Sterules of Chemicals in the dry condition, *e.g.* Arsenobenzol and Tylcalsin, for making solutions extemporaneously, are also convenient.

Sterules for Inhalation comprise sealed containers of chloroform 1, 2, and 4 ounce (30, 60 and 120 Cc. approx.), also Ether 1 and 2 ounces (30 and 60 Cc.), for the operating bag and for export to hot climates; and those of Amyl Nitrite; Ethyl Iodide and its combinations and similar compounds.

Ionic Sterules are for use in Iontophoresis, *vide* Iontophoresis Vol. II. For list of solutions in 'Sterule' form, *see* Index.

STRAMONIUM.

Dried leaves *Off.* and dried ripe seeds, B.P. '98, of *Datura Stramonium.* (*Solanaceæ*). U.S. requires not less than 0·25% stramonium alkaloids in the leaves when assayed as for belladonna.

Fr. Cx. has max. single dose, 4 grains, max. dose during 24 hours, 15 grains approximately.

Uses.—Its action is similar to belladonna, and employed for the same purposes. Is a usual ingredient in cigarettes and the fumigating powders employed in asthma.

In Spanish the plant is *Yerba de huaco,* 'Plant of the Graves.' The thorn-apple is used in South America in form of a drink which gives hallucinations in the nature of communication with the spirits of ancestors.—P.J. ii./12,686.

The leaves and seeds contain **Daturine,** which is identical with Hyoscyamine (*q.v.*) together with Hyoscyamine and Hyoscine.

Individual plants of *D. Stramonium* gave 0·47, 0·55, 0·52, and 0·46% Alkaloid and *D. Tatula,* 0·47, 0·63 and 0·65%, thus showing a marked variation.—Int. Cong., 1912.

Cultivation. The whole plant can be harvested with or without the root without fear of the total alkaloid content falling below 0·25%.—G. B. Koch, Am. Jl. Ph., January 1919, C.D. '19, 303.

Datura Metel Seeds from India contained 0·23% of total alkaloid consisting of Hyoscyamine and Scopolamine in proportion 2 : 1 together with a little Atropine. The capsules contained 0·1% of total alkaloid consisting of Scopolamine only.—P.J. ii./12,579, *see* also P.J. ii./05,230,617.

From the seeds of *Datura fastuosa var. Flor. coerul. plen.* which plant is said by many authorities to be identical with *D. alba,* Schmidt obtained Scopolamine 0·216%, Hyoscyamine 0·034%, and traces of Atropine. The var. *D. fastuosa flor. alb. plen.* gave slightly less of the constituents.

D. Alba, which grows wild in the Phillipines, as a source of Atropine and Hyoscyamine.—P.J. ii./16,297.

The leaves of *D. fastuosa v. alba* and *D. metel* as also seeds of the former are now *Off.* Tincture of Seeds 1 in 4, Alcohol 70%. *Dose.*—5 to 15 minims.

Stramonium seeds contain about 15–30% of a fixed drying oil. The seeds and leaves have about the same alkaloidal strength—average 0·22%

Honey collected by bees from *D. Stramonium* has been wrongly stated to be toxic. Observation showed that the flowers in question are not visited by bees. They are pollenated by night-flying insects with long proboscides—H. Deane, P.J. ii./13,134.

Xanthium Macrocarpum. N.O. Compositæ.—Have been offered as Spanish *Stramonium.*—Evans Anal. Notes.

Datura ***poisoning*** is common in Cairo. Symptoms are those of Belladonna poisoning. Writer has never seen a fatal case though many remained on verge of death for hours.—L. ii./21,1065.

℞ **Extractum Stramonii** (B.P., 1898).

Dose.—$\frac{1}{4}$ to 1 grain (**0·016 to 0·06 Gm.**).

An extract of the seeds in No. 40 powder prepared with Alcohol 70%. U.S. Extracts (Pilular and Powdered) are assayed to 1% alkaloids. The average yield of extract from the leaves is 20%.—Caspari.

In spasmodic asthma the extract found better than the tincture. Sufficient should be given to be slightly toxic. Most patients show toxic effects on taking $\frac{3}{4}$ grain in 24 hours.—B.M.J i./09,788.

℗ **Tinctura Stramonii** (*Off.* and B.P., 1898)

Dose.—5 to 15 minims, 1 of leaves to 5 of 45% alcohol.

Ⓟ **Mistura Antispasmodica, N.H.W.** (not in E.G.A.). Tincture of Stramonium, Tincture of Lobelia (Ethereal), Tincture of Opium, of each 6 minims, Chloroform Water to ½ ounce. Ⓟ **Mistura Asthmatica, N.H.W.** (not in E.G.A.). Tincture of Stramonium, Tincture of Lobelia (Ethereal) of each 10 minims, Ether 15 minims, Potassium Bromide 10 grains, Chloroform Water to ½ ounce.

Mistura Potassii Iodidi cum Lobelia. E.G.A.

Dose.—½ ounce (15 Cc.).

Potassium Iodide 5 grains, Ethereal Tincture of Lobelia 10 minims, Tincture of Stramonium 10 minims, Spirit of Chloroform 10 minims, Water to ½ ounce.

STRONTIUM.

Sr=87·63.

Strontium is probably the most inoffensive of the alkaline earth-metals. Its salts are relatively slowly absorbed.

Investigations at the Johns Hopkins University have shown that Strontium can be deposited in the bones with a resultant decrease of Calcium content. It is capable of transmission to the young from the mother and gives rise to a form of "Strontium rickets," which is not combatable with Cod Liver Oil. It is well to bear in mind its possible abnormal physiological behaviour. The entire abandonment of Strontium in therapy is suggested.—Jl. A.M.A., June, 1923, per P.J. i./23,573.

Strontii Bromidum (*Off.*), *Syn.* Koronium (Coronium) Bromide. $SrBr_2+6H_2O=355·566$.

Dose.—5 to 30 grains (**0·3 to 2 Gm.**).

In deliquescent crystals, 97% pure *Off.*, with bitter saline taste, ***soluble*** in less than an equal quantity of water.

Flavoring.—Syl Lavandulæ, Syl Menthæ Piperitæ.

Used in gastric affections, dyspepsia, and vomiting of nervous origin; also in epilepsy instead of the Potash salt.

This salt may decolorise Compound Tincture of Cardamoms in a mixture. —P.J. i./14,670,698.

Tablets contain each 5 grains (**0·3 Gm.**).

Effervescent Strontium Bromide. *Dose.*—1 drachm (=10 grains).

'**Vescettes**' of **Strontium Bromide** contain 10 grains.

Strontii Bromidum Exsiccatum.

Dose.—4 to 24 grains (**0·25 to 1·5 Gm.**).

On drying Strontium Bromide it loses most of its water of crystallisation, 4 parts are about = 5 of crystals.

Strontii Carbonas. $SrCO_3=147·635$.

Dose.—5 to 30 grains (**0·3 to 2 Gm.**).

Strontii Iodidum. U.S. $SrI_2+6H_2O=449·566$.

Dose.—5 to 20 grains (**0·3 to 1·2 Gm.**).

In white crystalline masses, freely soluble in water.

Exophthalmic goitre of children has been treated with this and the Bromide, also asthma, rheumatism, and chronic endocarditis.

Strontii Lactas, U.S. (1890). Fr. Cx $(C_2H_4\ OH.COO)_2Sr+3H_2O=319·788$.

Dose.—5 to 30 grains (**0·3 to 2 Gm.**).

A white crystalline powder, very soluble in water, of service in albuminuria and Bright's Disease. May be combined with iron in the albuminuria of pregnancy.

To increase coagulability of the blood 15 to 30 grain doses useful.

Strontii Salicylas, U.S. $[C_6H_4.OH.COC]_2Sr+2H_2O=397{\cdot}812$.

Dose.—5 to 20 grains (**0·3 to 1·2 Gm.**).

A white crystalline powder, slightly soluble in water and in alcohol.

Used for chronic gout and lithæmia, and a good intestinal antiseptic.

Ⓟ STROPHANTHUS (*Off.* and B.P. 1898). U.S.

The mature ripe seeds of *Strophanthus Kombé* (Oliver), (*Apocynaceæ*) freed from the awns, of a fawn colour, and covered with hairs. A section of the seed should give a green colour with a mixture of sulphuric acid 80 and water 20. *S. Courmontii* and several other species have been used as adulterants.

P. HUNG. gives *max. single dose* ¼ grain (0·05 Gm.), max. in 24 hours 0·15 Gm.

Commercial History of (Holmes).—P.J. i./06,312.

S. Hispidus and *S. Kombé* are the only two species giving a green reaction with Sulphuric Acid. Buying the seed in the pod is the safest method.—G. Sharpe, P.J. i./16,347.

Strophanthus Preussii from the Southern provinces of Nigeria acts powerfully on the heart, and may have therapeutic value.—Karam Samaan, P.J. ii./22,83.

Antidotes to **Strophanthus preparations**—

After stomach pump or emetics give Tannin or Gallic Acid in water, followed by stimulants. Anæsthetics to relieve spasm. Potassium Permanganate has been recommended.

Ⓟ *Strophanthin.

$C_{40}H_{66}O_{19}=850{\cdot}728$. FR. CX.

Dose.—$\frac{1}{300}$ to $\frac{1}{100}$ grain (**0·0002 to 0·0006 Gm.**) hypodermically. U.S. IX. gives average daily dose, caution—*per os*, 1/60 grain, intravenously 1/80 grain. Is irritating at the site of injection.

Dose by the mouth 1 to 4 mgr. and up to 4 mgr. a day; by intramuscular injection 1 to 3 mgr. a day and by intravenous injection ¼ to 1 mgr. and up to 2 mgr. a day. Given by the mouth it is often ill tolerated and strychnine (1 to 3 mgr. in the day) is the best antidote. Signs of overdose: headache, sense of tightness in the chest and præcordia, marked slowing or bigeminy of pulse, marked rise in blood pressure, cardiac arhythmia, insomnia, nausea are least seen with the intravenous use of the substance. Little success in heart affections obtained with the drug taken *per os*.

Contraindicated where there is a high blood pressure and marked arteriosclerosis and to those with acute or chronic nephritis or granular kidney.—B.M.J.E. ii./09,11.

A white glucoside, or "mixture of glucosides" (U.S.). Soluble in water and alcohol 90%, allied in its physiological action to digitalin and of bitter taste. Fuses at 170° C.

G. Cohn, writing on glucosides of the Digitalis group, differentiates 3 Strophanthins of commerce: H. Strophanthin $C_{71}H_{110}O_{16}$ from *S. hispidus*, K. Strophanthin $C_{32}H_{48}O_{16}$ from *S. Kombe*, and G. Strophanthin $C_{36}H_{56}O_{12}+9H_2O$, which is identical with Crystalline Ouabain.—Phar. Zentralh, per Y.B.P. 1913, 129.

The action of Strophanthin on cardiac tissue. Experimental work on the frog.—A. J. Clark, B.M.J. ii./13,897.

Uses.—As a cardiac tonic and diuretic. Resembles digitalis in effects but acts more promptly. Occasionally of service where the latter has failed or is not tolerated. Especially valuable in mitral stenosis, but unsuitable in aortic disease; pulse improves in force

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* See note under Digitalis Glucosides.

and rhythm, dyspnœa and palpitation are lessened, appetite is increased, action of bowels and perspiration not affected—non-cumulative. Of value in renal insufficiency. It is a better diuretic than Digitalis because, while it accelerates the circulation, it does not readily constrict the arterioles.

In heart failure, *intravenous* injection of 8–12 minims of 1 in 1,000 strophanthin solution (½ to ¾ mgr. of the base) has been successful.

In urgent heart cases Strophanthin intravenously is of unmistakable value.—W. Gordon, B.M.J. i./21,13.

Strophanthus is only about half as active on man as digitalis.—B.P. '98 tinctures being used.—L. ii./10,1615.

Strophanthus as diuretic *cf.* action of Digitalis, p. 405.

Caution.—To our knowledge the drug occasionally acts in an unaccountable manner—loss of consciousness has followed an ordinary dose in a weakened patient.

Granules de Strophanthine, Fr. Cx., $\frac{1}{10}$ mgr. and are coloured pink.

Poudre de Strophanthine au Centième. Fr. Cx. *Max. single dose* ½ grain, Max. during 24 hours 1½ grains approximately.

℗**Extractum Strophanthi** (*Off.* and B.P. 1898).

Dose.—¼ to 1 grain (**0·016 to 0·065 Gm.**).

The seeds are first percolated with purified ether, and then with 90% alcohol; the alcoholic percolate concentrated and mixed with milk sugar, so that 2 parts of extract in powder= 1 part of seeds.

℗**Tinctura Strophanthi** (*Off.*).

Dose.—2 to 5 minims (**0·12 to 0·3 Cc.**).

Prescribing Note.—It has been reported to us (1923) that a number of prescriptions containing *Tincture of Strophanthus* and Nux Vomica in mixture with Chloroform Water caused severe diarrhœa in nearly every case. There is a possibility of hydrolysis. The Tincture as 'Drops' would be preferable.

Strophanthus Seeds de-fatted with Ether in No. 30 powder 1, by percolation with Alcohol (70%) *q.s.* to 10. Is four times the strength of the B.P. '98 preparation. This conforms with F.I. U.S. IX. is 1 in 10 with Alcohol (94·9% Vol.), assayed biologically.

Fr. Cx. has F.I. strength with max. single dose 3 minims approx. Max. during 24 hours 12 minims approx.

The 1885 preparation was half the strength of the 1914. This gave good results in pneumonia—5 minim doses with the same amount of Capsicum Tincture.—L. i./07,808; B.M.J. i./07,626.

Physiologically Standardised Tincture of Strophanthus. According to Martin should have minimum lethal dose ½ minim (0·03 Cc.) per 20 Gm. frog in two hours. Strophanthus Tincture properly stored loses little in activity.

The seeds vary greatly in content, hence standardisation is desirable. It must be noted, however, that assayers' reports vary also, *cf.* Vol. II.

Fraser's Tincture of Strophanthus is occasionally prescribed. This was a 1 in 20 preparation in Alcohol 90% made from the seeds, defatted with Ether. *Dose.*—5 to 15 minims.

For a note on the Chemical Assay of the seeds, also for other methods of making tinctures, see Vol. II.

℗**Tabellæ Strophanthi**, equal to 2 minims of Tincture combined with chocolate. *Dose.*—1 to 3. ℗**Tablets**, Compressed, are also prepared equal to 2 and 5 minims of the Tincture.

***Tablets, Hypodermic**, contain **Strophanthin** $\frac{1}{500}$ grain.

***Ouabain**, $C_{30}H_{46}O_{12}$=598·518. A glucoside from Ouabaio wood obtained from a *Carissa sp.* of the same natural order as strophanthus, is in colourless lamels, slightly soluble in cold water, insoluble in absolute alcohol and ether, but soluble in glycero-alcohol (according to Schmidt 1 in 150 water

* Should certainly be *treated* as ℙ.

at 11° C. and in 27 alcohol 85%). It gives a red colour with sulphuric acid and has similar properties to Strophanthin, but is much more toxic in action. Ouabain has been used for whooping-cough in doses of $\frac{1}{1000}$ to $\frac{1}{250}$ grain every three hours. Study of its physiological action.—B.M.J.E. i./92,27. It is also obtained from *Acocanthera sp., q.v.*

Ouabain indicated in certain cases of cardiac insufficiency, with acute dilatation of the ventricles, and tendency to trigeminal rhythm, which are not affected except unfavorably by digitalis. Give intravenously in four ¼ mgr. doses every four hours.—B.M.J.E. i./21,102.

Ouabain is indicated in heart affections when infection is absent or of secondary importance and cardiac dilatation predominates as in hypertension, arterio-sclerosis, renal sclerosis, valvular lesions and pericardial adhesions. May be used alone or in association with Digitalis. Daily dose ¼mgr. repeated for 4 days or longer if necessary.—B.M.J.E. ii./21,77.

ℙ1 STRYCHNINA, (*Off.*), U.S. Fr. Cx.

ℙ1 *Applicable to Ireland also, and Salts of Strychnine.*

$C_{21}H_{22}N_2O_2$=334·297.

Dose.—$\frac{1}{64}$ to $\frac{1}{16}$ grain (**0·001 to 0·004 Gm.**). Fr. Cx.—*Max. single dose* $\frac{1}{12}$ grain. Max. during 24 hours ¼ grain approx. The alkaloid obtained from Nux Vomica, St. Ignatius' beans (q.v.) and the seeds of other species of *Strychnos*. In characteristic colourless crystals (not coloured by strong nitric acid : absence of Brucine). Exceedingly poisonous. Its absorption in the rectum is even more rapid than in the stomach, small intestine, œsophagus or colon.

It is supplied pink to cover brown tint forming in hot climates.

Soluble.—In water, 1 in 2,800 (according to our expts., 1924), about 1 in 400 of alcohol 60%, 1 in 150 of alcohol 90%, 1 in 400 of absolute alcohol, 1 in 6 of chloroform, nearly insoluble in ether.

Antidotes.—Apomorphine Injection or Emetics followed by washing out the stomach with Potassium or Calcium Permanganate solution 2 to 5 grains per pint, then give Potassium Bromide 4 drachm dose repeated in 2 drachm amounts every hour if necessary. Chloral in ½ to 1 drachm doses. ***Charcoal*** *ad lib* in water. Chloroform or Ether Anæsthesia. Amyl Nitrite and Paraldehyde. Art. resp.

Strychnine compares with Brucine in toxicity as 33 : 4.—Wright and Dixon.

Strychnine Antidotes. Interesting account of the early use of Strychnine. Magical effect of 1/20th grain doses in a paralytic. Also action of magneto-electricity on a dog after 2 grains. *Similia similis curantur.* Relaxation of muscles at once. In human poisoning, if promptly used, it would save life.—J. Mackenzie, P.J. i./22,502.

Recovery of a dog poisoned by Strychnine, in which the animal was stiff and in *rigor mortis*, by applying Chloroform to its nostrils ; the relaxation of its muscles permitted recovery.—U. Aylmer Coates, P.J. i./22,526. See also 'A.J.C.' *ibid*, 547.

J. P. Vaquier found guilty of murder of A. P. Jones at Byfleet. He had purchased 0·12 Gm. of Strychnine.—C. D. May 10 and July 12/24.

Flavoring.—For Strychnine Salts and preparations containing Strychnine, Syl Aurantii Amari, Syl Menthæ Piperitæ (very full dose).

ℙ1 **Pilula Strychninæ** contains $\frac{1}{25}$ $\frac{1}{30}$ $\frac{1}{40}$ $\frac{1}{50}$ $\frac{1}{60}$ $\frac{1}{80}$ and $\frac{1}{100}$ grain.

ℙ1 **Ferri et Strychninæ Citras,**

Average Dose.—2 grains (**0·12 Gm.**) in solution.

In scales varying in colour from garnet red to yellowish brown, freely soluble in cold water. It contains 1% of Strychnine, and Ferric Citrate corresponding to not less than 16% Metallic Iron.

℞ **Ferri, Quininæ et Strychninæ Citras.**

Dose.—3 to 6 grains (**0·2 to 0·4 Gm.**).

Similar to the former with about 15% of Quinine.

℞ **Strychninæ Arsenas.**

$C_{21}H_{22}N_2O_2.H_3AsO_4,\frac{1}{2}H_2O=485·289$.

Dose.—$\frac{1}{64}$ to $\frac{1}{16}$ grain (**0·001 to 0·004 Gm.**).

In small white acicular crystals containing 68·72% Strychnine, soluble 1 in 34 of water.

In phthisis by hypodermic injection of $\frac{1}{2}$% mixture with liquid vaseline. *Dose.*—4 to 15 minims daily.

In addition to this acid salt there is another composition $C_{21}H_{22}N_2O(H_3AsO_4)_2H_2O$. Soluble 1 in $16\frac{3}{4}$.—Dott, P.J. ii./11,173. It contains much less Strychnine (42·8%).

Strychnine Acetate is soluble 1 in 44, the **Hydrobromide** 1 in 70, the **Hypophosphite** (one of the most soluble salts) 1 in 3·3.

Dose of each as for Hydrochloride.

℞ **Strychninæ Hydrochloridum.**

$C_{21}H_{22}N_2O_2,HCl,2H_2O=406·797$.

Dose.—$\frac{1}{64}$ to $\frac{1}{16}$ grain (**0·001 to 0·004 Gm.**).

Small trimetric prisms, soluble 1 in 35·5 of water (by our experiments): alcohol (90%) 1 in 73.

A 1% (w/v) solution is strongly hypotonic, 0·079 Gm. Sodium Chloride or 0·442 Gm. Glucose to every 10 Cc. renders it isotonic.

A case recorded where life was in danger, had $\frac{1}{30}$ grain doses increased to $\frac{1}{6}$ grain *pro die* in a month. A Chinaman with beri-beri (paralysis of) had up up to $\frac{1}{4}$ grain *t.i.d.* Recovery in both.

℞ **Liquor Strychninæ Hydrochloridi** (*Off.* and B.P. 1898).

Dose.—2 to 8 minims (**0·12 to 0·5 Cc.**).

Strychnine Hydrochloride 1, Alcohol (90%) 25, Water to 100.

For **hypodermic injection.** *Dose.*—2 to 6 minims.

Incompatible with *Liquor Arsenicalis*, alkalis, *e.g.* Sodium Bicarbonate, Sal Volatile, Bromides and Iodides.

A small quantity of Glycerin added in place of equivalent of the spirit prevents crystallisation of the salt round the neck of the bottle.

Jowett showed by experiment that it is safer to prescribe Tincture of Nux Vomica in preference to Solution of Strychnine Hydrochloride when there is danger of incompatibility. There appears to be something in the combination of the Strychnine in the Tincture which tends to hold it in solution even in the presence of alkali.—P.J. i./13,402. H. Finnemore arrived at similar conclusions.—P.J. ii./14,124.

℞ **Injectio Strychninæ Hypodermica** (*Off.*).

Dose.—Hypodermically 5 to 10 minims (**0.3 to 0·6 Gm.**). Dissolve Strychnine Hydrochloride 0·75 Gm. in recently boiled and cooled Distilled Water 100 Cc.

℗ **Mistura Strychninæ Phosphorica. R.N.H.**

Solution of Strychnine Hydrochloride 3 minims, Dilute Phosphoric Acid 10 minims, Syrup of Ginger 30 minims, Water to 1 ounce.

℞ **Strychninæ Nitras, U.S., P.G.V., P. Belg., P. Hung.** *Dose.*—$\frac{1}{64}$ to $\frac{1}{16}$ grain (**0·001 to 0·004 Gm.**).

P. Hung. gives *max. single dose* $\frac{1}{6}$ grain (0·01 Gm.), max. in a day $\frac{1}{3}$ grain (0·02 Gm.). P.G.V. gives half these amounts.

$C_{21}H_{22}N_2O_2.HNO_3=397·313$.

Colourless needles, soluble 1 in 60 of water; in 42 at 25° C. U.S.

℞ **Tablets, Hypodermic,** $\frac{1}{100}$, $\frac{1}{60}$, $\frac{1}{40}$, $\frac{1}{20}$ grain.

℞ **Kidd's, Dr., Strychnine Nitrate Solution** 1 in 200. Various formulæ are provided. One is as follows:—Strychnine 1 grain, Distilled Water 45 minims, Strong Nitric Acid 5 grains, Alcohol (90%) 2½ drachms. Rub the Strychnine with the water in a glass mortar. Gradually add the Spirit and when cold add the Acid. After standing some days it becomes pale lemon colour.—P.J. ii./12,604.

Tabellæ Nitroglycerini et Strychninæ *v.*p. 572.

Strychnine Periodide. $C_{21}H_{22}N_2O_2.2I=588{\cdot}137$.

Dose.—1/100 grain (**0·0006 Gm.**) carefully increased, if desired.

Obtained by combination of Strychnine and Iodine in a suitable solvent as a dark red powder, containing about 56% of Strychnine.

Pharmacology.—It splits up with Physiological Acid, liberating 13·6% of alkaloid, and a further 10% to Physiological Alkali.

Doses of 1/200 and 1/100 grain were taken by two of the author's assistants (S.B. and K.F.). No discomfort caused, and no untoward symptoms observed.

Solubility.—Soluble in Chloroform, slightly soluble in Alcohol, insoluble in Ether and water.

Uses.—This novel form of the well-known alkaloid may be worthy of trial.

Dispensing Note.—To be given in form of *Leviyations* (*q.v.*) in 'slipule' (No. 5) or cachet.

℞ **Strychninæ Sulphas,** U.S. Fr. Cx.

$(C_{21}H_{22}N_2O_2)_2H_2SO_4+5H_2O=856{\cdot}75$.

Dose.—$\frac{1}{64}$ to $\frac{1}{16}$ grain (**0·001 to 0·004 Gm.**). Fr. Cx. *Max. single dose* $\frac{1}{10}$ grain; max. during 24 hours ¼ grain approximately.

The neutral salt is in prismatic crystals, soluble 1 in 62 of water; M.Pt. 200° C. It contains $5\frac{1}{2}H_2O$; *i.e.* there is usually a loss on drying of 11·44% approx.—Dott., P.J. i./12,425.

℞ **Hypodermic Injection** 1 in 100. *Dose.*—1 to 6 minims.

℞ **Tablets,** $\frac{1}{60}$, $\frac{1}{50}$ and $\frac{1}{30}$ grain each, for administration *per os.*

℞ **Hypodermic Tablets** $\frac{1}{100}$, $\frac{1}{60}$, $\frac{1}{50}$ and $\frac{1}{30}$ grain.

℞ **Strychninæ Sulphas Acidus** *Syn.* Hulle's Soluble Strychnine. $C_{21}H_{22}N_2O_2.H_2SO_4+2H_2O=468{\cdot}405$.

Dose.—$\frac{1}{64}$ to $\frac{1}{16}$ grain (**0·001 to 0·004 Gm.**).

In white silky acicular crystals with a slightly acid reaction, soluble 1 in 42 of water.

℞ **Strychninæ Valerianas.**

A non-crystallisable salt supplied in aqueous solution equivalent to 25% of the base. *Dose.*—$\frac{1}{25}$ minim to $\frac{1}{10}$ minim (=$\frac{1}{100}$ to $\frac{1}{40}$ grain of the base). In dispensing, dilution must be carefully made, and part rejected if necessary. A useful nervine tonic, especially for hysterical patients.

Uses of, and References to Strychnine Salts.

In cases of heart disease in which Digitalis is inadmissible, Nux Vomica and Strychnine are used as heart stimulants and for this purpose they are often combined with Caffeine. Patients almost dead from failure of the heart in the course of chronic cardiac disease may apparently be brought round by subcutaneous injection of Strychnine, but some doubt its efficacy.—Hale White.

In cardiology Strychnine has been unduly discredited.—W. Gordon, B.M.J. 1./21,13.

For old people, Strychnine and Nux Vomica have been described as the only useful bitter tonics.

For arresting progressive muscular atrophy Strychnine hypodermically the only treatment. Acts more directly than by mouth.—Gowers, Diseases of the Nervous System.

In chorea minor, incontinence of urine, gastralgia, drink craving, Strychnine is useful internally.

In severe cases of puerperal sepsis with failure of circulation often of great value hypodermically.—B.M.J. ii./09,1038.

In myasthenia Strychnine hypodermically is frequently beneficial but not curative.—L. i./10,355.

For sea sickness—Strychnine Sulphate $\frac{1}{60}$ to $\frac{1}{30}$ grain with Atropine Sulphate $\frac{1}{150}$ grain, either hypodermically or by the mouth in preference (but then less efficient), and repeated in a few hours if necessary. Surface of body should be kept warm.—B.M.J. ii./10,1199.

To produce any beneficial effect on gastric atony very *small* doses of Strychnine must be used.—T. Izod Bennett, B.M.J. i./23,369.

Strychnine as diuretic, *cf.* action of Digitalis, p. 405.

℗SULPHONAL (*Off.*).

$(CH_3)_2.C.(SO_2.C_2H_5)_2 = 228{\cdot}283.$

Sulphonmethanum, U.S. Fr. Cx., P.G.V., P. Hung.

Manufacturers and wholesale and retail vendors must label Poison and treat otherwise as ℗.

Syn.—Dimethyl-methane-diethylsulphone. Produced by oxidation of a compound of ethyl-mercaptan and acetone. In colourless crystals or powder, tasteless and odourless, ***soluble*** about 1 in 450 of water. In alcohol 1 in 80, freely in hot alcohol. Melts at 125·5° C.

Dose.—10 to 30 grains (**0·6 to 2 Gm.**). In cachets or suspended with mucilage. P.G.V. has *max. single dose* 2 Gm.; max. during 24 hours 4 Gm. Fr. Cx. Supp. 1920 has max. single dose 1 Gm. and during 24 hours 2 Gm. Should be finely powdered, and followed by a draught of hot fluid. Unless in solution, a dose should be given an hour before sleep is desired.

Antidotes.—See chapter on.

Uses.—Hypnotic, but is not curative of pain: does not affect digestion, pulse, or temperature, especially desirable for nervous subjects. Useful in chorea. Is slow in action on account of slight solubility; 30 grains may be given in solution in 1 ounce of brandy with 2 ounces of boiling water added (=about 140° F.).

Continuous administration of Sulphonal. Dangers and precautions to be adopted. Initially, on introduction of the drug, it appeared ideal for calming motor excitement of the insane. By adequate dose one was able to exercise almost any degree of sedative effect, from production of slight lethargy to almost complete paralysis. Then came a period of disillusionment. Among lesser evils were conditions of paresis, local or general, with ataxia in some persons—in others temporary state of mental enfeeblement simulating dementia. The occurrence of hæmatoporphyrinuria was the most serious sequel. Later it became better understood and used again in asylum practice. Fatal accidents seldom occur if given with care and patients watched. If given undissolved it may remain a long time in the alimentary canal. *As far as possible it should be given in solution.* To give 20 grains, ½ pint of a hot beverage at least is needed—milk or whisky. Watch carefully for renal irritation. It should not be given over a long period without a break nor to persons suffering from chronic constipation. Contraindicated in chronic alcoholism.—G. M. Robertson, Jl. Mental Sci., Apl. 1911.

Hæmatoporphyrinuria, followed by increasing weakness, flaccid paralysis and death, after lengthy treatment with Sulphonal (20 grains daily for three months).—Wilfred Harris, L. ii/22,854.

In the Sulphonal group it was held that the more Ethyl groups introduced, the more hypnotic effect—but Sulphonal with its two Ethyl groups is still the most popular, and Trional is more popular than Tetronal, wh ch is seldom employed.—B.M.J. ii./10,1113.

Trismus neonatorum has been cured by enemata of 3 grains supplemented by internal use, but its use is not without risk where considerable physical prostration. Recovery after 365 grains in an adult.—L. i./04,219. Also afte 5 to 6 Gm.—L. i./09,811.

Enuresis well treated with small doses.—L. ii./17,728, *cf.* Therap. Index.

Ⓟ **Tablets,** 5 grains (**0·3 Gm.**). *Dose.*—1 to 6. Should be crushed and taken in warm water. Ⓟ **Capsules** contain 5 and 10 grains.

Ⓟ **Effervescent Sulphonal** contains 5 grains in 1 drachm.

Ⓟ **Haustus Sulphonal,** Sulphonal 20 grains to 1 ounce of **Mistura Mucilaginosa,** (Mucilage of Gum Acacia 2 drachms, Syrup 30 minims, Water to 1 ounce.) (Was in G.H.)

Reversed Sulphonal.' *i.e.*, Diethyl-methane-dimethyl-sulphone is probably included as Ⓟ by the Order in Council. It is not a homologue of sulphonal but a metameride.—B.M.J. i./13,836.

Ⓟ **Methyl-sulphonal** (*Off.*). *Syn.* ✱**Trional** (T.M. 273851)—Fr. Cx. Diethyl-sulfone-methyl-ethyl-methane. **Ph. Ned., P. Belg., P. Helv., P. Jap., Sulphonethyl-methanum, U.S.**

The signature of a *firm*, Registered No. 279228, has also been used in connection with the name Trional. Expired Patent 16333/1888.

N.B.—Conditions of Sale as for Sulphonal q.v.

$CH_3.C_2H_5.C.(SO_2.C_2H_5)_2$=242·304.

Dose.—10 to 20 grains (**0·6 to 1·2 Gm.**), in cachets, in a large cup of hot liquid. Fr. Cx. Supp. 1920 gives latter approx. as max. single, and during 24 hours. P.G.V. has max. during 24 hours 60 grains.

An oxidation product of mercaptol made by the condensation of methylethylketone with ethylmercaptan.

In minute crystals, soluble 1 in 320 of water—*Off.* We find in practice, 1 in 420, in alcohol 90% about 1 in 11, and in ether. M.pt. 76 to 76·5° C.

Uses.—Has a hypnotic action intermediate between those of sulphonal and tetronal. Has cured chorea. Useful for the insane. Tetronal is the better sedative, Trional is more effective in sleeplessness connected with neurasthenia and organic brain disease. Both are useless in insomnia due to pain, and in morphine and cocaine habits.

Ⓟ **Tablets,** 5 grains (**0·3 Gm.**). *Dose.*—1 to 6.

Recovery after effects of 125 grains.—L. i./03,1096.

Poisonings by Trional successfully treated by injections of Strychnine, Smelling Salts, and 1 drachm doses of Sulphate of Magnesium every four hours.—L. i./10,04.

Ⓟ **Haustus Trional,** 30 grains to Mucilage Mixture 1 ounce. (Was in G.H., *cf.* Haustus Sulphonal),

Applying Hans Meyer's Theory *q.v.*, Therapeutic Index—Insomnia, to these methane derivatives of the Sulphones, the coefficient of Trional is 4·46, Tetronal 4·04, Sulphonal only 1·59, which is in practice about their activity. *Trional best of the three, Sulphonal should be dropped, Tetronal too dangerous.*—B.M.J. i./09,554.

SULPHUR.

S=32·06.

Dose.—20 to 60 grains (**1·2 to 4 Gm.**) in milk or treacle, with confection of senna, or as Pulvis Glycyrrhizæ Compositus. Sublimed sulphur in fine powder, for use either internally or externally, is preferred to Precipitated.

Uses.—*Internally* it has no action on the stomach but a certain proportion administered is converted into alkali sulphides in the intestines with consequent mild laxative effect. Given internally it has been employed for skin affections: occasionally benefiting chronic eczema with much itching. Hale White says its powers in bronchitis and rheumatic affections are doubtful. *Externally* sulphur is commonly used to cure scabies and for acne.

Sweating of the feet has been treated by drachm doses thrice daily.

In diphtheria Sulphur as an insufflation caused death in a child of 9. The practice (dangerous), it appears, is common in South Wales.—L. ii./16,29.

As an antiseptic, Sulphur suspended in glycerin has been injected into suppurating sinuses.

Sulphur Lotum, U.S., is washed with ammoniated water.

'Colloid' Sulphur prepared by precipitating sulphur from polysulphides with an acid in the presence of albumin, is said to be a better antiseptic than ordinary precipitated sulphur.—*cf.* pp. 372 and 386.

In skin affections the skin has been painted with a solution of Sulphurated Potash 1 in 2 twice. The part is then subjected to Acetic Acid Vapour or dabbed with 5 to 10% Acetic Acid. Sulphur is adherent as a thick coating. —B.M.J.E. i./13,96.

Ringworm of the groin (singularly intractable) treated by means of Nascent Sulphur, formed by applying a 6% Hyposulphite of Sodium Solution on lint covered with oil silk for about 10 minutes, followed by painting with 3% Tartaric Acid Solution.—J.M.H. MacLeod, Pr., Dec., '12,827.

Confectio Guaiaci Composita, L.H. **'Chelsea Pensioner'**

Dose.—1 drachm (**4 Gm.**).

Guaiacum Resin in powder 2, Sublimed Sulphur 4, Mustard 4, Potassium Nitrate 1, Rhubarb Root 1, Treacle to 64.

Acid Potassium Tartrate is added to some formulæ.

St. M.'s H. has Guaiacum Resin 10, Magnesium Carbonate 10, Sublimed Sulphur 15, Treacle 60. This is a more usual formula.

Confectio Sulphuris. (*Off.*).

Contains 45% Precipitated Sulphur with 11% Acid Potassium Tartrate. *Dose.*—1 to 2 drachms. (**4 to 8 Gm.**).

Confectio Sennæ et Sulphuris. C.H., U.C.H.

Dose.—1 to 2 drachms (**4 to 8 Gm.**).

Confection of Senna 1, Confection of Sulphur 1.

Pulvis Guaiaci Compositus (Chelsea Pensioner), St. G. H.

Dose.—20 to 40 grains (**1·2 to 2·6 Gm.**).

Guaiacum Resin, Precipitated Sulphur, Heavy Magnesium Carbonate, Gum Acacia and Potassium Bicarbonate, equal parts. The Confection (*v.* above) is more used.

Jephson's Powder. *Dose.*—60 grains (**4 Gm.**).

Precipitated Sulphur 2, Guaiacum Resin 1. For tonsillitis, acne, and constipation.

Tablets of Precipitated Sulphur 5 grains with Potassium Acid Tartrate 1 grain are prepared.

'Stearettes' of Sulphur 5 grains each are prepared.

In the alimentary canal the action of Sulphur only takes place at a point where its contents have ceased to have an acid reaction, and the formation of H_2S and Sulphides will be hastened by an increase in alkalinity. 'Stearettes' of Sulphur are hence suggested in the treatment of acne, furunculosis, urticaria, etc.

Trochisci Sulphuris. (*Off.* and B.P. 1898). *Dose.*—1 to 6.

Contain approx. precipitated Sulphur 5 grains and Acid Potassium Tartrate 1 grain. For skin and rheumatic affections.

Garrod's formula is 4 grains of the Sulphur with 1 grain of Potassium Acid Tartrate in each. See also **Pastilli.**

Unguentum Sulphuris. (*Off.*). 1 to 9 Benzoated Lard.

Scabies is treated by Sulphur Ointment after washing with soft soap. Use equal parts of the B.P. Ointment and Vaseline.

Unguentum Sulphuris et Zinci cum Kaolino. Sulphur 4, Zinc Oxide 3, Kaolin 1, Benzoated Lard 8. For sweating of the feet.

℗Unguentum Sulphuris cum Hydrargyro, U.C.H.

Sublimed Sulphur 30, Sublimed Mercuric Sulphide 2, Ammoniated Mercury 2, Arachis Oil 12, Lard 54. Useful in skin diseases.

Suggested additions: Either 2 grains of vermilion, 10 minims of eucalyptus oil, 10 grains of phenol, or 5 minims of creasote per ounce.

Unguentum Sulphuris Camphoratum E.L.

Precipitated Sulphur 10, Phenol 15, Camphor 15, Solution of Coal Tar 15, Vaselin 220, Benzoated Lard to 440.

Unguentum Wilkinson. *Syn.* WILKINSON'S OINTMENT. P. JAP. IV.

Triturate together Sublimed Sulphur 1, Tar 1, Potash Soap 2, Benzoated Lard 2, Purified Talc 0·5. (TAR, P. JAP. is from several species of *Pinus*).

Unguentum Sulphuris Hypochloritis.

Sublimed Sulphur 12, Essential Oil of Almonds 2, Prepared Lard 84; mix, and add with quick manipulation Sulphur Chloride 2 (a Reddish Liquid S_2Cl_2=135·04).

Keep in a stoppered bottle; is sometimes made double this strength. Useful in acne, psoriasis and scabies.

Unguentum Sulphuris Iodidi (B.P. 1898). Contains Sulphur Iodide 4 (S_2I_2=317·96), Glycerin 4; mix in a warmed mortar, and add Benzoated Lard 92. For tinea.

Unguentum Sulphuris et Naphthol Salicylatum.

Tinea circinata can be rapidly cured by an ointment of Sulphur ½ drachm, Salicylic Acid 10 grains, Naphthol 3 grains, Vaseline 1 ounce.

Sulphuretted Hydrogen Solution.

Is prepared by saturating Distilled Water with Hydrogen Sulphide (H_2S). To preserve, add a little Carbon Di-sulphide.

Lotio Sulphuris cum Sapone.

Precipitated Sulphur 30, Eau de Cologne 60, Glycerin 4, Soft Soap ½, Rose Water to 500. Is recommended for acne of the face.—W. W. W.

Lotio Sulphuris, C.X.

Precipitated Sulphur 20 grains, Glycerin 10 minims, Methylated Spirit 15 minims, Lime Water 2 drachms, Water to 1 ounce.

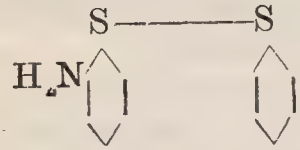
Lotio Sulphuris Composita. C.X.
Precipitated Sulphur 15 grains, Zinc Sulphate 15 grains, Sulphurated Potash 15 grains, Water to 1 ounce.

Sulphaqua Charges are for dissolving in water to produce sulphur baths for use in skin diseases, gout and rheumatism.

Balneum Sulphuratum. St. Th. H. Sulphurated Potash $\frac{1}{8}$ to $\frac{1}{4}$ ounce per gallon. **St. M.'s H.** is 10 ounces to 30 gallons.

Pomatum Antipsoricum, F.E. *Syn.* **Helmerich's Pomatum.** Sublimed Sulphur 10, Distilled Water 5, Almond Oil 5, Potassium Carbonate 5, Lard 35. All by weight. Is used for scabies. Fr. Cx. has poppy seed oil *vice* almond oil.

***Intramine.** (T.M. 370133). *Syn.* Di-ORTHO-AMINO-THIO-BENZOL



248·292.

Dose.—For *intramuscular* use, this preparation is supplied in two solutions to be mixed immediately before use in the proportion of one volume of the No. 1 solution and two volumes of the No. 2 solution. The resulting colloidal emulsion contains one per cent. of Intramine. *Dose.*—1 to 5 Cc. The injection is not painful. Intramuscular use is stated to be the most active.

For *intravenous* use a 0·1 per cent. colloidal emulsion is supplied ready for use in 50 Cc. ampoules. The contents of one ampoule comprise the usual adult dose.

For *internal* use keratinised gelatin capsules are made, each equivalent to 0·5 Cc. of the 1% colloidal emulsion. Dose one to three capsules thrice daily after meals.

For *local* use in the treatment of chronic ulcers, the preparation as supplied for intramuscular injection, can be applied twice a day for not more than three days.

Manufacture.—By oxidising o-Amino-phenyl-mercaptan with Ferric Chloride. It can also be made by heating aniline and sulphur.

The compound is in pale yellow crystals, *soluble* in ether, alcohol and Acetone; insoluble in water.

Uses.—For the treatment of syphilis and protozoal diseases, J. E. R. McDonagh advocates the use of Intramine in conjunction with arsenical compounds. Intramine prevents arsenical dermatitis, and diminishes the risk of neuro-syphilis. In the late stages of syphilis the use of Intramine should precede arseno-benzol and mercury. Intramine is stated to act as a specific in cases of metallic poisoning.

In chronic cases of mercurial stomatitis and nephritis, arsenical dermatitis, hepatitis and nephritis and lead poisoning, weekly intramuscular injections of 2·5 Cc. are advocated.

In chronic bacterial diseases, it is a remedy for gonococcal urethritis, and it is stated there is no drug so efficacious in acute gonorrhœal rheumatism. Good results have been obtained in non-pustular form of acne vulgaris, acne rosacea, seborrhœic eczema and rheumatic skin affections; while it will frequently heal soft sores which have resisted other treatment. In ulcus molle serpiginosum its action is almost specific.

In a case of '606' dermatitis the immediate improvement following the administration of Intramine was marked.—A. R. Fraser, L. ii./19,480, 481.

One or two injections of Intramine permits the assimilation of much more mercury; in some cases as much as 10 grains of mercurial pill were taken daily with impunity, though previously signs of intolerance had been manifest. —G. W. Rundle, L. i./20,1268.

In cases of toxic jaundice occurring during the early stages of syphilis, Intramine is the best remedy given in doses of 3 Cc. at intervals of five days. In mild cases two doses are sufficient, in more severe cases as many as 10 injections have been given. Exfoliative dermatitis following even two doses

of N.A.B. well treated by Intramine 2·5 Cc. intramuscularly in the buttock repeated every fifth day until disappearance of the erythema in simple cases or the exfoliation in severe cases.—E. G. Ffrench, L. i./20,1262,1263.

Diortho-amino-thiobenzol is practically a specific for metallic poisoning while the acetyl derivative is as inert as plain colloidal or sublimed sulphur.—C. A. Hill, Pres. Add. B.P. Conf., 1920.

As the reducing action of protein particles is regulated by non-metals and in all living cells by Sulphur, the introduction of Intramine in treatment of syphilis is regarded as a boon. It not only increases the therapeutic action of Arsenobenzol and Mercury but it prevents metallic intoxication and causes symptoms of such to vanish if prescribed early enough. Give 2·5 Cc. intramuscularly in all cases of syphilis after the fourth or fifth intravenous dose of Arsenobenzol either once or twice. In late cases one or two injections should precede any treatment with metals. If the case of metallic poisoning is urgent 100 to 300 Cc. of Colloidal Iodine should be given intravenously and 2·5 Cc. of Intramine intramuscularly into each buttock. Repeat in five days if necessary.—J. E. R. McDonagh, Pr., Jan. 1920.

Sulphur was formerly much used in treatment of syphilis; it has been revived in the form of Intramine. For cases having a persistent Wassermann Reaction in spite of usual Arsenic and Mercurials, Sulphur should form part of further course.—C. F. Marshall and A. G. Shera, L. i./21,1299.

To intensify action of Salvarsan and to ward off metallic intoxication Intramine given by intramuscular injection in syphilis of central nervous system.—R. Hearn, B.M.J. ii./22,37.

***Contramine** (T.M. 422175). *Syn.* DIETHYL-AMMONIUM DIETHYL-DITHIOCARBAMATE. $SNH_2(C_2H_5)_2CSN(C_2H_5)_2$=222·357.

Dose.—Intramuscularly 4 grains (**0·25 Gm.**) to 8 grains (**0·5 Gm.**) in 1·5 or 3 Cc. of cold sterilised water or saline. *Must not be heated. Intravenously*, 0·25 Gm. in 10 Cc. of Saline containing 1 Gm. of glucose.

Occurs as white crystals, soluble 1 in 2½ of water.

Manufacture.—An addition product of Carbon Bisulphide and Diethylamine. This is a general reaction for primary and secondary aliphatic amines.

Uses.—In syphilis, rheumatism, arthritis, fibrositis, gonococcal urethritis, skin affections and chronic ulcers.

Salvarsan-Jaundice, causation and treatment with aid of Contramine.—F. Chamberlain, L.i. /22,733.

Selenium. Se=79·2.

This element was originally discovered by Berzelius in the Lead Chamber-deposits in the manufacture of Sulphuric Acid. It occurs in various Blendes and minerals,—with Lead, Copper, Silver, Iron, etc.—at least three allotropic varieties are known. The chief source of Selenium is Iron Pyrites in which a part of the Sulphur is replaced by Selenium. Traces of Selenium occur in Bismuth preparations.

Selenium and Tellurium belong to the Sulphur group. Selenates and Tellurates are highly poisonous.—unlike Sulphates.

Colloidal Selenium, see **Colloidal Metals.**

Selenium Oxide. *Dose.*—1/64 grain (**0·001 Gm.**) internally 3 to 4 times daily increasing the dose gradually.

Cancer has been treated with this, on the assumption that it conveys Oxygen to the Sulphur in the organism, thereby increasing secretion of Sulphuric Acid in the urine. It has been observed that Sulphuric Acid excretion is lessened in cancer patients.

Selenium preparations do not easily lose their effectiveness as oxidising agents. In the body they constantly move between the higher and lower degrees of oxidation, and their oxidising power is thereby constantly regenerated.

In *malignant disease*, Selenium Injections (1 to 5 Cc. intramuscularly) submitted to extensive trial with bad results. General toxæmia became worse; ulceration, necrosis and secondary hæmorrhage supervened. If given at all, limit to 2 or 3 small doses.—A. S. Gillett and C. P. G. Wakeley, L. i./22,804.

Conductivity of Electricity by metallic Selenium is increased by light. This is made use of in the **Optophone** invented by Dr. F. d'Albe which enables the blind to read print.—B.M.J. i./21,574.

Selenium Aromatic Compounds.—Attempts to form the Selenium analogue of Arsanilic Acid, namely p-amino-phenylselenic Acid $NH_2C_6H_4SeO_3H$. (Aniline Sulphate and Arsenate readily yield Sulphanilic Acid and Arsanilic Acid at an elevated temperature but no similar compound can be obtained from Aniline Selenate). *M*-aminophenylselenic acid and an acetyl and other compounds are, however, described.—F. L. Pyman, J. C. S., 1919,166.

Further Organic Selenium Compounds in Vol. II.

SUPPOSITORIA.

Suppositories containing various Medicaments weigh, when prepared with Cacao Butter, 15 grains and upwards. They are preferred with both ends conical shaped so as to pass more easily and be retained by the sphincter muscle.

Suppository Mass for Use in and Export to Hot Climates, **(a) Gelatin Basis.**

As pointed out under Ovule Masses, it is almost impossible to make a basis that shall stand temperatures above 100° F. and yet melt at body temperature. The best one can do is to fortify with Gelatin so that the melting point is *not much above* 98° *to* 99° *F.*

Bougie Mass (*q.v.*) carries out these conditions when there is a sufficiency of adherent moisture on the part.

(b.) Theobroma Basis.—

The *Off.* statement on the subject is, "More or less Beeswax may be used in place of Theobroma according to prevailing temperatures," 5 to 10% is commonly employed. We consider 15% is best, but it must be remembered that different samples of Theobroma Oil and White Wax each have somewhat different melting points. Certain Melting Points we find are yielded by mixtures in proportions stated under "Ovule Masses for Hot Climates." The remarks there given apply equally to Suppositories with Theobroma Oil basis.

✱**Sempules** (T.M. 329438) for the treatment of hæmorrhoids are suppositories with a wide core, coated with a Medicated Theobroma basis. The suppository has a bulb at each end. which it is claimed keeps the stem in the anal canal. They are medicated with the usual medicamenta and are supplied in gelatin with two Melting Points 80·6 F. and 89·6 F., also with Theobroma basis.

Tampons. For vaginal and uterine medication the following are made. The pledgets are globular in shape, about 1½ in. in diameter, composed of **wool, gauze covered.**

Glycerin Tampons. Saturated with glycerin. **Tannin Tampons,** S.H. Saturated with 1, 5 and 10% Tannin in Glycerin. **Ichthyol Tampons** saturated with 5, 10 or 20% Ichthyol in Glycerin. **Iodoform Tampons,** S H., with 5% Iodoform in Glycerin.

TABLETTÆ.
(Compressed Tablets).

In the preparation of Tablets the material has first to be *granulated*, to make it flow easily from the 'hopper' and to prevent it sticking between the dies and punches of the machine; this is effected by moistening with a little alcohol or water (to which, if desired, a minute quantity of mucilage diluted about 1 to 4, may be added), rubbing through a suitable sieve (No. 16), and drying *thoroughly* either by very slight heat, or better, by exposure to the air if sufficiently dry at the time. The decomposition, melting points or volatility of the chemicals to be compressed must be borne in mind, Salol, Beta-Naphthol, Benzoic Acid, Sulphonal, Trional and Phenacetin should not be heated. To obviate the sticking referred to, lubrication with Boric Acid (2%), or spraying with a solution of Soft Paraffin or Cacao Butter in 1 in 6 each Ether and Alcohol, or less of the latter is resorted to in some instances.

Substances already in small crystals, *e.g.* Potassium Chlorate and Ammonium Chloride, do not require this treatment. Tablets *to dissolve like lozenges* require half their weight of a mixture of equal parts of Acacia and Tragacanth. Owing to ***Incompatibility,*** Sodium Bicarbonate and Calomel, Saccharin and Rhubarb, Salol and Camphor, Salol and Thymol, Caffeine Citrate with Acetanilide and Antipyrin, Salicylic Acid and Iron Compounds, Chloral and Alkalis, Mercuric Chloride and Metals, oxidising agents, *e.g.* Potassium Chlorate and Permanganate, with Charcoal, Sulphur, Iodine or Sugar, should not be compressed together.

Five or ten per cent. of (potato) starch thoroughly dried is useful to ensure rapid breaking up of the Tablet. Deliquescent compounds should be treated with Gum Acacia or Tragacanth.

Similarly, if the powder is of a very dusty nature the judicious use of a little of these gums or of glucose or 10% Gelatin Solution is an advantage. Fibrous drugs may have 5% Dextrin. Many substances if compressed too hard are liable to cause the tablet to crack—this is particularly the case with Phenacetin and Antipyrin—the least possible amount of pressure should be applied that will produce a permanent tablet.

The majority of 5-grain Tablets are made to weigh $6\frac{1}{4}$ grains with Milk Sugar.

Acetanilide. 1 grain in $1\frac{3}{5}$ grains. Add 5% Potato Starch.
Acid Aceto-Salicylic (*Syn. Aspirin*). A little lubricant may be necessary.
Aloin as Arsenious Acid, *q.v.*
Alum. Dry thoroughly to remove water of crystallisation.
℗ *Arsenious Acid.* Sugar of Milk, with a small amount of lubricant.
Balsams. Mix with 25% Magnesia and evaporate to dryness.
Bismuth Carbonate and Sub-nitrate. Make 5 up to $6\frac{1}{4}$ with Cane Sugar (some use Lactose), adding a small percentage of lubricant.
Bismuth Salicylate, as Salicin.
Bismuth and Soda. Bismuth Carbonate 3, Sodium Bicarbonate 2, Lubricant *q.s*
Caffeine, as Arsenious Acid.
Calomel. Sugar of Milk as diluent.
Cascara. Compress the Extract properly granulated.

Charcoal to have 25% Cane Sugar or Acacia, or Gelatin Solution with a small amount of lubricant.

Ⓟ *Codeine*, as Arsenious Acid. Ⓟ *Digitalin*, as Arsenious Acid.

ℙ1 *Dover's Powder*. 2½ grains in 3 grain tablet.

Effervescent Materials may be granulated separately and mixed dry.

Ginger may have 5% Dextrin.

Gregory's Powder. Make 5 up to 6¼ with Cane Sugar, moistening with Water.

Grey Powder. Needs sugar and Strong Mucilage.

Guaiacol. Make up with Sugar, adding Water and Lubricant *q.s.*

Ipecacuanha. Make up with Sugar and Water. Some employ 5% Dextrin.

ℙ1 *Mercuric Biniodide* (for administration *per os*) as Arsenious Acid. ℙ ℙ1 *Morphine*, as Arsenious Acid. ℙ1 *Nux Vomica Extract*, as Arsenious Acid.

Oily Substances require 2 to 5% Calcined Magnesia.

ℙ ℙ1 *Opium*. Mix with Sugar or Sugar of Milk, using a little lubricant.

Pancreatin. 5 grains in 6¼ grain tablet.

Pepsin. Mix with Sugar, granulate with 60% Alcohol, and use lubricant *q.s.*, 5 grains in 6¼ grain tablet.

Phenacetin. Make 5 grains up to 6¼ grains with Sugar, 5% Potato Starch. and a little Glucose useful. Lubricant, *q.s.*

Phenazone. Make 5 up to 6¼ with Sugar.

Podophyllin. as Arsenious Acid.

Quinine—use Starch and lubricant *q.s.* 2 grains in 2¼ grain tablet.

Saccharin prepared with Sodium Bicarbonate, *q.s.*

Salicin. Mix with Sugar, and use lubricant *q.s.*

Salol requires 10% Potato Starch, with Sugar. 5 grs. made up to 6¼.

Soda Mint. Sodium Bicarbonate, Peppermint Oil, Acacia, *q.s.*

Sodium Salicylate. Make 5 up to 6¼ with Cane Sugar, Lubricant *q.s.*

ℙ1 *Strychnine* as Arsenious Acid. Ⓟ *Sulphonal* as Salicin.

Thyroid. Made of Desiccated Thyroid Gland with lubricant *q.s.*

Zinc Sulphate for lotions. Remove water of crystallisation.

Stearettes, *i.e.*, Tablets coated so as to be more likely to dissolve in the intestines than in the stomach, *vide* p. 683.

Tablet Triturates are made in metal or vulcanite moulds which are worked by hand, yielding 50 to 200 at a time, the weights ranging from ½ grain (0·03 Gm.) to 1 grain (0·06 Gm.) and the diameters between ⅛ and $\frac{5}{32}$ inch, and ⅛ inch in depth. The active ingredient is mixed with Lactose or Sugar, the whole being massed together with a little alcohol or alcohol and water.

For Hypodermic Tablets, Sterilised Milk Sugar, or Cane Sugar is a useful diluent. These are prepared under the strictest aseptic precautions. A little Boric Acid is useful as lubricant. Dried Neutral Sodium Sulphate, Sodium Chloride and Ammonium Chloride are also employed in some instances. Hypodermic Tablets are well made in a Tablet Triturate mould with holes $\frac{5}{32}$ in. in diameter, the plate being $\frac{1}{10}$—⅛ inch in depth.

Notes on Manufacture of Tablets.—P.J. ii./08,276; ii./11,432.

For List of Tablets in general demand *see* Index.

TEREBENUM.

Dose.—5 to 15 minims (**0·3 to 1 Cc.**).

A colourless liquid consisting of dipentene and other hydrocarbons, produced by the action of sulphuric acid on oil of turpentine and distillation. Sp. Gr. 0·862 to 0·866,—*Off.* It has an agreeable odour resembling fresh-sawn pine-wood. Boils at 160 to 170° C. U.S.

Modifications of Pharmacopœial Standards. The O.R. Test is useless. Owing to change in character of Turpentine the specific gravity of Terebene is invariably lighter. It should distil mainly between 165 and 185° C., not more than 5% below 160° C.—B. F. Howard, B.P. Conf., 1919.

Soluble about 1 in 4 alcohol 90% by our experiment. *Off.* says 1 in 5. The substance is indefinite, and a sample we examined is as

clear 1 in 4 as 1 in 5 ; soluble in all proportions in absolute alcohol or chloroform. It is not miscible with water, but may be emulsified by mixing it with one-sixth its weight of tragacanth powder, then adding water and shaking.

Uses.—An agreeable antiseptic, disinfectant, and deodoriser. The vapour is a useful sedative and antiseptic inhalation in phthisis, *e.g.*, in a respirator, and, administered at the same time in 5-minim **Capsules** or **Pastils**. It may also be inhaled for cough, *e.g.* whooping cough and in hay fever. Useful also in dysentery *per os*.

In excess it may produce albuminuria and hæmaturia.

Pruritus.—Recurrent cases often accounted for by mental worry. Terebene on sugar is a good intestinal disinfectant and stimulant, also useful in urticaria in children, *e.g.*, in a mixture with Magnesium Carbonate.—L. ii./12,968

Haustus Terebeni.—Vic. Park.

Terebene 10 minims, Mucilage of Tragacanth 1 drachm, Glycerin 1 drachm, Cinnamon Water to 1 ounce.

Vapor Terebeni, T.H.

Terebene 40 minims, Light Magnesium Carbonate 20 grains, Distilled Water to 1 ounce. A teaspoonful in a pint of water at 140° F. for inhalation. For medicating antiseptic respirators, 10 drops of a mixture of equal parts, Terebene, Phenol, and Spirit of Chloroform, is often used.

Terpinum Hydratum, U.S., Fr. Cx., P. Hung.—*Syn.* Terpine. $C_6H_8(OH)_2.CH_3.C_3H_7+H_2O=190{\cdot}226$.

Dose.—2 to 6 grains (**0·12 to 0·4 Gm.**) or more, in cachets, slipules, or pills, or suspended.

Prepared by acting during cold weather upon Rectified Oil of Turpentine 4, Alcohol 80% 3, with Nitric Acid 1 in flat dishes. Crystals separate after several days, and are recrystallised from 95% Alcohol rendered slightly alkaline. Yield 12% of the oil taken.—Caspari.

Sir W. A. Tilden, F.R.S., Prof. W. H. Perken, F.R.S., and J. C. Umney on Terpenes—advance course lectures.—P.J. i./12,581, 651, 723, 756, 817 See also P.R., July, 1912, Synthesis of the Terpenes—*ibid.*

A derivative of oil of turpentine in prismatic crystals, soluble in water about 1 in 250, 1 in 44 of alcohol 90%, and about 1 in 6 in oils.

Flavoring.—Prescribed as **Linctus Pini Terpin et Heroin** *q.v.*, lessens cough ; has been used with success in bronchitis, chronic and subacute ; it assists expectoration, *e.g.*, in initial catarrh of phthisis ; useful as a hæmostatic in bleeding from lungs. Diuretic also.

Terpino . *Dose.*—1½ minims (**0·1 Cc.**) or more in pill, or gelatin capsule. An agreeably aromatic liquid, containing bodies of the composition $C_{10}H_{16}=136{\cdot}178$ and $C_{10}H_{18}=154{\cdot}194$. Is obtained by the action of dilute sulphuric acid on terpene. Miscible with alcohol in all proportions, but insoluble in water. It is used for lung affections ; if it disorders the stomach it should be given with meals. In pulmonary hæmorrhage in 3 drop doses used with advantage.—J. W. Allan, Glas. Med. Jl., Nov., 1913.

Methylene Blue dissolves in boiling Terpinol producing a colourless solution; the colour, however, precipitates again on cooling.—W. T. Robinson.

Terpineol. *Syn.* Terpilenol. $C_{10}H_{17}OH=154{\cdot}194$. A product of fractional distillation of Terpinol Sp. Gr. 0·940 used for disguising odour of Iodoform and for scent making (in the name of Artificial Lilac). *Syn.* **Cinyl Alcohol,** described—Allen, 1911, Vol. IV., p. 280.

THEOBROMA.

The seeds of Cacao, *Theobroma Cacao* (*Sterculiaceæ*). When heated and deprived of husk and membrane, these yield **Cocoa nibs.** The nibs ground, and most of the oil pressed out, produce, when reduced to powder, the best forms of **Cocoa** for use as a beverage.

For further details on Cocoa, see Vol. II.

Oleum Theobromatis. *Syn.* CACAO BUTTER.

The concrete oil of the seeds (yield about 45%). Melting at about 86 to 91·4 F. (30 to 33° C.), *i.e.*, below the temperature of the body, is much used for suppositories. For substances which lower the melting point of the oil, and for export to hot climates, it is well to add 5 to 15% yellow wax. (*cf.*—'Ovules.').

Note on Cacao butter and substitutes.—P.J. ii./09,158.

To deodorise for cooking, it has been suggested to heat the oil in an open pan to 370° F. for five minutes and cool again, and to give it butter consistence to add to each 4 parts of cacao butter melted, 5 parts of cotton seed oil.

Pasta Theobromatis, Chocolate.

This is made by grinding the nibs into a paste, with sugar and vanilla or other flavouring added; it should contain not more than 50% of sugar and about 25% of fat (*Oleum Theobromatis*), and be free from gum, added starch, or other admixture.

The author uses chocolate for the preparation of medicated **Tabellæ.** On account of its agreeable flavour and the preservative action of its fat and sugar, it forms a useful basis for administering many medicines. The solvent action of its fat renders it eminently useful for fixing **Nitro-glycerin, Erythrol Nitrate, Mannitol Nitrate, Menthol,** and alkaloids. For full list *vide* Index—Tabellæ.

Theobromina.* **Ph. Ned.**

$C_5H_2(CH_3)_2N_4O_2$=180·131 (*See also* p. 262). *Syn.* DIMETHYL-XANTHINE, SANTHEOSE.

Dose.—1 to 5 grains (**0·06 to 0·3 Gm.**).

Alkaloid, about 1 to 2% from the seeds, in white crystalline powder, *sparingly soluble* in water, alcohol and ether. Caffeine is trimethyl-xanthine. 2% solutions may be obtained with aid of Tri-Sodium Phosphate.

Uses.—As a diuretic, relieves cardiac and renal dropsy (but some think it bad therapy to put extra work on diseased kidneys), and in angina pectoris, 20 to 30 grain doses spread over 24 hours lessen the frequency and severity of attacks. Given in cachet and pill.

A tendency to cardiac failure in pneumonia is often well treated by strong coffee. It has a tonic effect on the heart.—Burney Yeo.

Theobromine-Sodium-Sodio Acetate. *Syn.* **Theo-Sod-Acet.**

✱AGURIN (T.M.322517). $C_7H_7N_4O_2Na+NaC_2H_3O_2$=284·557.

Dose.—10 to 15 grains (**0·6 to 1·0 Gm.**), up to 45 grains daily in fresh solution. 'Slipule' No. 00 holds 10 grains.

White crystalline hygroscopic powder soluble 1 in 2 of water and about 1 in 200 of alcohol 90%. In dropsy, sciatica and neurasthenia.

* Note this body is an Ureide and may be included in the Order as a (P)Poison, *cf.* Ureides, but in our opinion it can *not* be considered poisonous in therapeutic doses.

Is strongly diuretic in action. Not to be given with acid substances, nor with sugar or gum, and in general *incompatible* as for Theo- Sodo-Sal *q.v.* To be preserved from the air, the CO_2 of which tends to decompose it. Relieves cardiac dropsy.

Theobromine-Sodio Sodium Formate. *Syn.* '**Theo-Sodo-Form**' $C_7H_7N_4O_2Na.HCOONa.H_2O=288{\cdot}152$. *Dose.*—8 to 15 grains (**0·5 to 1·0** Gm.).

A white powder soluble in water; analogous in action with 'THEO-SODO-SAL'; *incompatible* as the latter. Diminishes coagulability of the blood. **Tablets** 8 grains.

Theobrominæ Aceto-Salicylas. $C_7H_8N_4O_2C_9H_8O_4 = 360{\cdot}24$. *Dose.*—1 to 5 grains (**0·06 to 0·3 Gm.**).

White crystalline powder soluble in alcohol. Has some advantages due to containing the Aceto-Salicylic grouping.

Theobrominæ et Sodii Salicylas (*Off.*).—*Syn.* '**Theo-Sodo-Sal,** ★**Diuretin** (T.M. 223214). P. AUSTR., F.E., PH. NED. $C_7H_7NaN_4O_2+C_6H_4(OH)COONa=362{\cdot}198$. *Dose.*—10 to 20 grains. (**0·6 to 1·2 Gm.**). Max. dose *pro die* 90 grains. Slipule No. 00 holds 10 grains.

Manufacture.—Rub Theobromine 18 to a paste with water 10, Dissolve Sodium Hydroxide 4 or *q.s.* in water 8 and add to the Theobromine until clear. Add Sodium Salicylate 16, filter and evaporate on a water bath or *in vacuo.*

A sodio-salicylic compound containing about 50% of sodium-theobromine in white powder, soluble 1 in 1 in water (a little Sodium Salicylate added will often 'clear' a strong solution). This solubility we find refers to the freshly made compound.

It is rapidly decomposed in moist air with absorption of CO_2 and liberation of Theobromine—hence less soluble in water. It must be kept in *stoppered* bottles. B.P. requires 40% Theobromine, U.S.P. 46·5%. Theory for $Na_2C_{14}H_{12}N_4O_5$ is 44·19% Sodium Salicylate and 55·81% Sodium Theobromine. C. T. Bennett and F. B. Windle recommend new method for B.P. analysis. —P.J. i./21,472.

Incompatibles: Theobromine Sodium Salicylate and Theophylline Sodium Acetate are incompatible with Ammonium Salts, Sodium Bicarbonate and all acid salts, alkaloidal salts, free inorganic and organic acids, and Aromatic Spirit of Ammonia.—J. W. Plenderleith, P.J. i./23,364.

Flavoring—Glyl Lavandulæ, Syl Vanillæ; Syrupus Zingiberis, Extractum Glycyrrhizæ Liquidum.

Uses.—Diuretic (*cf.* Theobromine), without affecting nervous system and causing sleeplessness. Safe for scarlatinal dropsy of children. In angina pectoris it lessens the frequency of attacks. Given for cough.

Tablets contain 5 grains.

The action of this body upon the renal secreting cells has been disputed—some say its diuretic effect is due to its power of causing dilatation of the renal vessels. It is said also to promote the elimination through the kidneys of common salt. Should be given in small dose—3 to 6 grains.—B.M.J. i./11,290.

Lithium-Diuretin. *Syn.* UROPHERIN.

$C_7H_7LiN_4O_2 + C_6H_4(OH)COOLi = 330{\cdot}078$. *Dose.*—5 to 15 grains (**0·3 to 1 Gm.**).

A white powder soluble 1 in 5 of water. A similar diuretic.

Iodo-theobromine. (*Syn.* **Theobromine Sodium-Iodo-Salicylate**).

Dose.—2 to 10 grains (**0·12 to 0·6 Gm.**).

White powder, containing about 40% theobromine with 22% sodium iodide and 38% sodium salicylate, soluble in water, is a good diuretic and heart stimulant, increasing blood pressure. In cirrhosis of the liver and acute nephritis.

Theobromine-Sodio Sodium Iodide. *Syn.* EUSTENIN $C_7H_4O_2.NaNaI=352·043$.

Dose.—8 to 15 grains (**0·5 to 1 Gm.**).

Has been given in arteriosclerosis, angina and aortic aneurism.

Theophylline, DIMETHYL-XANTHINE. (Isomeric with Theobromine). *Syn.* ✱THEOCIN. (T.M. 247465/1900 *removed* but 322570 is on the Register) $C_5H_2(CH_3)_2N_4O_2=180·131$. (*See also* p. 262.)

Dose.—3 to 6 grains (**0·2 to 0·4 Gm.**).

White crystalline powder, soluble 1 in 200 (by experiment) of cold water and about 1 in 90 of Alcohol (90%). Marked diuretic.

Has been found useful in heart affections attended with symptoms of congestion, and nephritis with dropsy. **Tablets** weigh 4 grains.

Theophylline-Sodio Sodium Acetate (contracted to 'THEOPHYLLINE SODIUM ACETATE').

$C_5H(CH_3)_2N_4O_2Na.NaCH_3COO=284·277$.

Dose.—2 to 4 grains (**0·12 to 0·25 Gm.**) dissolved in water, three or four times daily after meals.

Flavoring.—Glyl Menthæ Piperitæ, Syl Vanillæ.

Nausea may be prevented by small doses of Menthol beforehand, *e.g.* $\frac{1}{10}$ grain in 15 minims of Tincture of Orange.

The compound is made on the lines of the analogous Theobromine Compounds (*vide antea*).

White flocculent powder—*Soluble* about 1 in 20. For œdema and dropsy of cardiac origin. For excitable neuropathic individuals. Paraldehyde may be given simultaneously.

Theophylline Sodium Acetate Tablets—4 grains are prepared.

In epidemic nephritis among soldiers this drug appeared to act as a renal irritant as well as diuretic and unsuitable in acute cases. The same true of Diuretin. Hot air baths have definite limitations. Only useful if followed by diuresis. Low nitrogenous diet recommended during the acute stages but one containing variety.—Langdon Brown, L. ii./16,863.

The addition of Theocin to digitalis therapy in dropsy often "tips the balance" and makes the kidneys act. Has proved suitable when both heart and kidneys are diseased. The action is often very striking. Theocin Sodium Acetate may start its action within an hour. If no effect is manifested within 24 hours, or after 40 grains it is of little use continuing the drug. Theocin appears to act more effectively after the patient has taken a sufficient amount of digitalis to affect the heart.—G. A. Sutherland, L. i./17,441.

THORIUM.

Th. = 232.

Manufacture.—Thorium occurs as Silicate in Thorite and Orangite in Norway. For details of the manufacture of Thorium and Mesothorium from Monazite Sand (content 4% of Oxide), *see* Vol. II.

Gas Mantles contain 99% Thorium Oxide and 1% Cerium Oxide. For history and description of Incandescent Lighting, see C.D. ii./07,315, and E. White, P.J. ii./12,580.

The following Salts and Compounds of the Element, by reason of their radioactivity, relatively slight in comparison with Radium it is true, have found therapeutic utility.

We deal here with the 'ordinary' inorganic and organic compounds; the radio-active bodies and their disintegration products are dealt with in Vol. II.

Thorium Oxide. ThO_2=264.

A heavy white powder insoluble in water and dilute acids.

Injectio Thorii Oxidi.

A suspension in Vaseline Oil has been suggested for diagnostic purposes in "X" ray work, to replace Beck's Bismuth Paste.

Thorium Pads, containing **Thorii Hydroxidum,** $Th(OH)_4$= 300·032, have been made to fit the part affected, *e.g.*, head, spine, &c. For use in nerve affections.

Thorii Nitras.—$Th(NO_3)_4$=480·032 ($+4H_2O$=552·096).

White crystals—usually in commerce with water of crystallisation. Apart from its use in the mantle industry is employed for producing Thorium 'X' and the Emanation Inhalation (*q.v.* Vol. II).

Soluble in water 1 in less than 1; in Alcohol 1 in 5.

Exsiccated Salt is soluble to the extent of $2\frac{1}{2}$ in 1 of water (by experiment, 1914).

Thorii Chloridum $ThCl_4+8H_2O$=517·968, and **Thorii Sulphas** $Th(SO_4)_2 4H_2O$=496·184.

White crystals—the former soluble in water—the latter slightly so.

Typhoid and paratyphoid and other intestinal affections well treated by Thorium Sulphate at the rate of 4 Gm. *pro die* either in form of 2% solution or in cachets. Effects said to be most marked.—Paris Medical, 1917, 7, 398 (Nov. 10th). See also Pres., Jan. 1918.

Organic Thorium Compounds.

The following organic salts have been prepared and are supplied under the brand ✱"**Thoriac**" (T.M. 274176). The lactate and the sulpho-carbolate are soluble in water; the others being insoluble or only slightly soluble compounds, suggest themselves for external employment in the form of dusting powder, pigment, or ointment.

Uses.—The sulphocarbolate may be found of use in intractable skin diseases. The ointment of oleate (*q.v.*) has been found of utility in these affections.

Doses.—Some of the compounds have not been extensively used; we are of opinion that 1 to 5 grains can safely be given providing the effects be carefully watched, beginning with the smaller amount —*cf.* the large doses of the sulphate recently given.

Thorii Camphor-Sulphonas.

$Th(C_{10}H_{15}O.SO_3)_4,9H_2O$=1319·064.

The camphor sulphonic acid necessary is prepared by acting upon 152 of camphor (in solution in acetic anhydride) with 98 of sulphuric acid, producing, theoretically, 232 of camphor-sulphonic acid. This quantity requires theoretically, 75 of thorium hydroxide for saturation. Well-defined crystals.

Thorii Cinnamas. $(C_6H_5.CH:CH.COO)_4Th$=820·404.

Thorium cinnamate is made by treating sodium cinnamate with thorium nitrate. It contains about 32% ThO_2. Insoluble in water.

Thorii Ortho-Coumaras. $(C_6H_4OHCH:CH.CO.O)_4Th$=884·404.

Prepared by double decomposition between thorium nitrate and sodium ortho-coumarate. A fine white powder, insoluble in water.

Thorii Aceto-Coumaras, *vide* **Tylmarin-Thorium,** p. 32.

Thorium Glycerophosphate, Phthalate and Camphorate.
Prepared by double decomposition. White powders.

Thorii Lactas. $Th[CH_3.CH(OH).COO]_4,2H_2O=624{\cdot}252$.
By interaction of the freshly precipitated hydroxide with lactic acid. It is a crystalline soluble salt, but becomes basic and less soluble on keeping.

Thorii Oleas.
Thorium Hydroxide 300 will interact with approximately 1,120 of oleic acid. A little ether is added to dissolve the oleic acid. The salt is at first pasty, becoming hard ultimately. Suggested for use in the form of an ointment with paraffin basis for eczema.

Unguentum Thorii Oleatis (Drage). Contains 25% Thorium Oleate rubbed into a smooth cream with Almond Oil.
Used with marked success in old chronic psoriasis, eczema rubrum, gouty eczema, and in boils and carbuncles (very efficacious.—W.H.M.)
In our knowledge sycosis was cured with a few applications.

Thorii Quinas.
This is prepared by treating the hydroxide (freshly precipitated) with quinic acid. Scales are easily obtained. *Soluble* in water 1 in 1 easily, slightly in alcohol, 90%.

Thorii Salicylas.—This salt, made by precipitating thorium nitrate with sodium salicylate, is a basic one in form of white, insoluble powder apparently having the formula $(C_6H_4OH.COO)_2$ $ThO=522{\cdot}15$. It contains 50% ThO_2.

Thorii Sulphocarbolas. *Syn.* THORIUM *p*-PHENYL-SULPHONATE.
$Th(C_6H_4.SO_3.OH)_4,9H_2O=1086{\cdot}664$.
A well-defined crystalline salt with pinkish shade of colour. Suggested as a radio-active antiseptic. Readily soluble in water and about 1 in 3 in alcohol 90%; but from both the solutions we find that separation shortly occurs owing apparently to dissociation.

Thorium-Sodium Citrate Solution as *Pyelographic Medium*—*see Vol. II.*

THYMOL.

$C_6H_3(CH_3)(OH)C_3H_7,1:3:4,=150{\cdot}162$.
Dose.—½ to 2 grains (**0·03 to 0·12 Gm.**), in pills with soap and a trace of Alcohol, or in oily or aqueous solution. Anthelmintic. *Dose* 15 to 30 grains (**1 to 2 Gm.**).—*Off.*
A Phenol obtained from the oils of *Thymus vulgaris, Monarda punctata,* (*Labiatæ*) and *Carum copticum—Umbelliferæ.* The oil of the last mentioned is *Off.* as Oleum Ajowan* with not less than 40% Thymol. *Oleum Thymi* is official in U.S., and assayed to contain 20% phenols.

*Omam.—*Syn*, Ajowan.* The drug is given in the dose of 10 to 30 grains (0·6 to 2 Gm.) as Extractum Ptychotis Liquidum P.I.
Aqua Ptychotis P.I. (Omam water) made by distillation with the fruit is given in the dose of 1 or 2 ounces (30 to 60 Cc.). The dose of the volatile oil is 1 to 3 minims (0·05 to 0·2 Cc.).—N. S. D.

Monarda Punctata Oil contains 60% Thymol as against 45 to 50% in oil of Ajowan from India. *Origanum hirtum* growing in Crete and Dalmatian coast contains 60–67%. *Mosla Japonica* 44%. Wild Thyme of France 20% —P.J. i./15,114. It is produced on a commercial scale from Oil of Ajowan Seed.—D. Hooper, P.J. ii./16,49.

Thymol is in large transparent crystals melting at 111° F. having the odour of thyme and a burning taste.

Soluble 1 in 1,500 of water, 1 in 200 of glycerin, 1 in 8 of alcohol and glycerin, equal parts ; soluble in fats and oils, and 8 in 3 of alcohol 90%, and freely soluble in ether, acetic acid and caustic alkalis. Liquefies Menthol, Chloral Hydrate, Camphor and Phenol.

Uses.—Externally a powerful antiparasitic, also for certain stages of eczema and psoriasis (*see* Unguentum) and for burns (*see* Volckmann's solution). A powerful antiseptic. (Our experiments prove this *cf. Antiseptic Powers, Vol. II.*). It is also a good deodorant. May colour the urine green. The administration simultaneously with or immediately after a large dose of a solvent of thymol, *e.g.*, alcohol, should be avoided. May be inhaled (*see* Vapor).

ANKYLOSTOMIASIS. Thymol 10 to 30 grains (0·6 to 2 Gm.) or more, in fine powder mixed with milk sugar is taken fasting repeated in 2 hours time and *followed by purge* (Sodium Sulphate in preference).

It is sometimes combined with Betanaphthol.

Ankylostomiasis treated by ½ drachm dose of Beta-Naphthol and Thymol ½ drachm in a one ounce draught, repeated.—H. G. Phippen, B.M.J. i./23,371.

Thymol, 3 cachets of 15 grains, given at intervals of 2 hours—routine treatment.—N. Cantlie, Jl. Trop. Med., Feb. 1/23,42.

For mode of infection, details of the parasite and further notes on treatment of ankylostomiasis, vide Carbon Tetrachloride, this vol. and Vol. II.

Tænia.—One or two doses of 5 grains in the early morning with a tumblerful of water generally causes tapeworm to be passed in a stool in the evening.—George V. Perez, B.M.J. ii./13,49.

Goitre—recent cases treated by 10 grain doses twice daily. Patient's dietary should contain no solvent of Thymol. Give as coarse powder and wash down with draught of water. In some cases swellings in the neck disappear rapidly. β Naphthol also beneficial. Maj. McCarrison regards the action of Thymol in goitre as very strong, though not conclusive evidence that the habitat in man of the organism responsible for the production of goitre is the intestinal tract. The action is a local one on the gut. The drug acts by destroying the living excitant of goitre or by reducing its activity or numbers so that the production of toxic substances is lessened and the thyroid is relieved of the excessive demand for secretion which necessitated the hypertrophy. —L. i./13,368; L. ii./06,1574; and Therap. Index.

Tuberculous abscesses have been treated by injections of Thymol 1, Camphor 2, Ether 3.

For ***skin sterilisation.*** A 5% Alcoholic Solution of Thymol has been used in the place of Iodine Tincture (*q.v.*) prior to the commencement of the operation. Two applications are made with an interval of five minutes, three minutes after second application the operation may be started.

Thymol Disinfectant (*Martindale*).

This preparation was made during our investigation of the antiseptic power of Essential Oils (*q.v.*). It is one of the most potent antiseptics made, having a "*Lancet*" Carbolic Acid Coefficient of 10·4. It is employed as a general disinfectant and for instruments and

in less strength for use to mucous membranes. For *Medical Purposes* a 0·1% (10 minims to the pint) dilution with water, forming a white emulsion, will have the same bactericidal power as a 1% Solution of Phenol. A stronger proportion than this (which would contain 1 of actual Thymol in 3,000) cannot well be tolerated by the mucous membrane—hence should be used with caution as it causes a temporary stinging sensation.

For *General Disinfection* 1 in 200 (one tablespoonful to 5 pints).

Liquor Thymol. 1 in 800 of warm water.

This saturated aqueous solution is used diluted as an antiseptic gargle, but we agree with J. T. Hall, B.M.J. ii./17,99, that undiluted it is too strong. It "stings like mustard."

As a mouth wash found efficient by cultural experiments.—H. P. Goodrich, B.M.J. i./17,473.

Lotio Potassii Thymatis U.C.H.

Thymol 8, Solution of Potash 120, Glycerin 16, Water to 1,000.

Mistura-Oleo-Balsamica.—*Syn.* BALSAMUM VITÆ HOFFMANNI. 'Tincture of Life.' *Dose.*—1 to 4 drachms in water.

Oils of Lavender, Thyme, Lemon, Nutmeg and Orange Flowers of each 4 ; Oil of Cloves and Cinnamon 3½ of each ; Balsam of Peru 10½ ; Alcohol 90% to 1,000 ; allow to stand a few days, then filter.

Is used in Africa as a remedy for snake bites. A carminative stimulant.

Ophthalmic Discs of Thymol contain $\frac{1}{1000}$ grain (0·000065 Gm.).

Pastilli Thymol contain $\frac{1}{32}$ grain.

Pigmentum Thymol.

Thymol 1, Ether 10, and Spirit 5, or Thymol 1, Petroleum Oil 18, used as pigments in ringworm of the scalp, whilst acting as parasiticides they dissolve the fat, loosen the hairs and thus help epilation. 2½ to 5% in a mixture of chloroform and olive oil also used.

Sapo Thymol St. G. H.

Thymol 1, Soft Soap 20, Alcohol to 40.

Thymaglycine. (*Martindale*). *Dose, per os.* 10 to 30 minims (0·6 to 2 Cc.).

A preparation containing Sodium Benzoate 3, Glycerin 10, and Thymol Water 50%.

As such, or diluted is beneficial in rhinitis, pharyngitis, quinsy, to brush the gums, and in gastric and intestinal catarrh.

For spraying into the throat and nostrils, may be diluted 1 to 3 with water. For **vaginal irrigation** dilute with 20 times its volume or less of water. Colitis has been treated with an irrigation diluted 1 in 6.

To ward off colds douche the nose with Thymaglycine as such or diluted 1 to 3 of water. In measles the necessity of wiping out the mouth with a preparation of this kind is often forgotten.

As a preventive against microbic infection—notably as anti-rheumatic treatment, it is most important to wash the nasal mucous membrane and the throat (tonsils in particular) with an antiseptic lotion.—W. P. S. Branson, B.M.J. ii./12,1429.

Colitis in children. 5 to 10 drops in paraffin or water well tolerated and effectual. It also acts well against threadworms and has been found of great value in whooping cough.

✱**Glycothymoline** (T.M. 231933). A proprietary article employed in catarrhal conditions of the mucous membrane of the nose, throat, stomach, intestine, uterus and vagina. Said to consist of Potassium Carbonate, Sodium Benzoate, Sodium Borate, smaller portions of Sodium Salicylate, Thymol, Menthol, Glycerin, and Alcohol, coloured with Cochineal.

The antiseptic power of Thymol is thought to be hindered by the presence of glycerin in preparations of this kind—*cf.* Glycerin Antiseptic Power. *Vol. II.*

Spiritus Thymol.

Dose.—3 to 15 minims (**0·2 to 1 Cc.**).

Thymol 1, Alcohol (90%) to 10; for medicating the wool of respirators. In scabies, where the infection is limited and recent, this solution is suitable for short applications.

Volckmann's Thymol Solution.

Thymol 1, Alcohol 20, Glycerin 20. Dissolve and add to water 1,000. Used as a spray and antiseptic lotion, as for burns.

Unguentum Thymol.

L. H. has 20 grains to the ounce of Soft Paraffin. *Dissolved by heat.* Applied half strength to the skin, keeps off gnats. &c. Used in the later stages of eczema and for other skin affections.

Unguentum Thymolis Compositum St. Th. H.

Thymol 5, Boric Acid 30, Zinc Oleate 60, Hydrous Wool Fat 120, Yellow Soft Paraffin to 437·5.

Thymol Wool, also **Gauze**, 5%, are used as antiseptic dressings.

The late Lord Lister's directions for charging gauze with Thymol,—the charging mixture being composed of Thymol 16, Resin 50 and Spermaceti 500 to be manipulated in a 'hot box.'—L. ii./13,1595.

Vapor Thymol, T.H.

Thymol 6 grains, Alcohol 90% 1 drachm, Light Magnesium Carbonate 3 grains, Water to 1 ounce. A teaspoonful to a pint of water at 140° F. for inhalation. Stimulant and antiseptic.

Thymol Carbonate.—*Syn.* **Thymotal.**

Dose.—5 to 15 grains (**0·3 to 1 Gm.**).

A nearly tasteless, colourless, crystalline powder. Is not dissolved by the stomach and therefore proves valuable as a remedy for *Ankylostomum duodenale*, common in Italy. May prove useful in obstinate cases of tænia and other intestinal worms. **Tablets** contain 10 grains.

Thymoform Tablets

Dose.—One occasionally.

Contain Thymol and Formic Aldehyde in a Cane Sugar basis as an antiseptic throat lozenge.

✱**Arhovin** (T.M. 280681).—Diphenylamin Ethylthymyl benzoate, $C_6H_4.C_{10}H_{13}.COO.C_2H_5.(C_6H_5)_2NH$=451·427. *Dose.*—4 minims in capsules.

In gonorrhœa also used as bougies, 0·01 to 0·05 Gm. in each.

TINCTURÆ.

Tinctures are made by *percolating* the drug in more or less fine powder with the menstruum (usually alcohol) in a percolator, or by *macerating* in a closed vessel for a length of time with shaking.

We have proved experimentally that in many instances the same effects can be produced by a few hours maceration, as with the customarily prescribed 'seven days' or more.

Non-Alcoholic, 'GLYCERIN,' or 'AQUEOUS' Tinctures.

Some of these are in occasional demand, but the alkaloidal ones can have little activity, unless a suitable acid can be used to ensure their solution. The **Glycetracta**, with which we have experimented, should replace them.

Ethereal Tinctures of certain drugs are made, *e.g.*, Belladonna, Capsicum, Iodine and Menthol.

For the **dispensing of resinous tinctures** in mixtures, **Mucilage of Acacia** yields satisfactory mixtures with most Tinctures except in the case of Tinct. Benzoini Co., Jalapæ, Myrrhæ, and Tolu. The Mucilage is best diluted with as much water as possible, and the tincture then added.

If **Salts** be present in the mixture the above rule applies, except in the case of Cannabis, where Tragacanth Mucilage should be used. Tincture Podophylli requires no suspending agent in the absence of salts, but if any be present Mucilage of Acacia is best used.

Tragacanth Mucilage answers well for suspending Tinct. Jalapæ and Myrrhæ, but is useless for Tinctura Benzoini Co., Quininæ and Tolu. For Tinct. Benzoini Co. and Tinct. Tolu, the two mucilages combined are best. In the case of a mixture containing 1 drachm of resinous tincture to the ounce, dilute 1 drachm of Mucilage of Acacia with as much water as possible, add the tincture, and lastly add the Mucilage of Tragacanth.

Tinctura Hydrastis, which in absence of salts requires no suspending agent, should have an addition of Mucilage of Tragacanth if salts be present. Tinctura Lupuli and Tinctura Cimicifugæ require no addition either in presence or absence of salts.

Total solids and ash from a number of B.P. Tinctures.—P.J. ii /07,738.

TRAGACANTHA (*Off.*).

Dose.—2 to 10 grains (**0·12 to 0·6 Gm.**) or more.

From *Astragalus gummifer* and some other species (*Leguminosæ*).

To detect acacia in tragacanth.—P.J. ii./04,453.

Gelanthum (Unna's Jelly).

Heat in a steam bath Tragacanth 110 grains, Gum Acacia 30 grains, Gelatin 120 grains, and Distilled Water 10 ounces, for 4 hours; press the paste through muslin, mix well and add Glycerin 6 drachms, heat again in a water bath for an hour, and add Thymol Water *q.s.* to 12 ounces.—Ph. Form. modified. This is similar to the formula in E.L. A basis for various antiseptic applications for skin medication.

Glycerin of Tragacanth (*Off.* and B.P. 1898).

Tragacanth, in powder, 1, Glycerin 3. Mix, and add Water 1. Useful pill excipient. **Glucantha**, (was in G.H.) Tragacanth 240 grains, Water ½ ounce, Syrup of Glucose 2 ounces.

'Cremor-Sicc.' Preparations.—Desiccating Creams for application to the skin. A small portion rubbed on the part in a thin layer rapidly dries and forms a protective coating. The following medicaments can be incorporated in the basis:—

Adrenalin 0·1%, **Alum Acetate** 5%, **Argyrol** 2%, **Boric Acid** 5%, **B. Naphthol** 5%, **Cade Oil** 10%, **Capsicin** 2%, **Chrysarobin** 5%, **Cicatricine** 10%, ℞ℙ**Cocaine** 2%, **Collargol** 2%, **Formosyl** 10%, **Ichthyol** 5 and 10%, **Ichthyol Resorcin** 5%, **Iodoform** 5%, **Lactic Acid** 5%, **Liquor Carbonis Detergens** 5%, **Menthol** 5%, Ⓟ**Mercuric Chloride** 1 in 5,000, Ⓟ**Mercuric Oxide Yellow** 2%, ℞ℙ**Opium** 5%, **Phenol** 2%, **Resorcin** 2 and 5%, **Salicylic Acid** 2 and 5%, **Sulphur** 10%, **Thorium Hydroxide** 10%, **Thymol** 0·1%, **Xeroform** 5%.

The basis contains 25% of **Zinc Oxide.**

Cremor Emolliens. *Syn.* SKIN CREAM, U.C.H.

Tragacanth 1, Methylated Spirit 7, Glycerin 14, Olive Oil 3½, Simple Tincture of Benzoin 2, Water to 100.

Mucilago Tragacanthæ (*Off.* and B.P. 1898).

Dose.—1 drachm to 1 ounce (**4** to **30 Cc.**) or more.

Improved formula suggested by the writer:—

Alcohol (90%) 120 minims. Put in a 20-ounce dry bottle and add Tragacanth, in powder, 60 grains. Shake till evenly moistened and add Distilled Water *q.s.* to 10 ounces. Shake again quickly to make a uniform mucilage. This keeps much better than mucilage of acacia. One part to 3 of aqueous fluid will suspend heavy powders. *Vide* also resinous tinctures.

Spirit of Chloroform instead of spirit suggested.—'Abel Scholar,' C.D. i./16,102.

Mucilago Marantæ. *Dose.—Ad lib.*

Triturate Arrowroot 6 drachms with water 2 ounces to make a smooth paste and make up with boiling water to 1 pint. Heat until semi-transparent. Cool and add spirit of chloroform 2 drachms.

To suspend Bismuth and other suitable heavy medicaments this and a similar preparation of cornflour has been found useful. It will suspend bismuth salts in a proportion as high as 1 drachm to the ounce.—Cpl. Cattel, Dispenser R.A.M.C., ex C. & D.

Pulvis Tragacanthæ Compositus (*Off.*).

A mixture of Tragacanth, Gum Acacia, Starch, and Sugar.

Dose.—10 to 60 grains (**0·6** to **4 Gm.**). Is used as last preparation, 10 grains to 1 oz., specially useful for bismuth oxynitrate.

TRITURATIONS, U.S.

Triturations are diluted powders of active substances made with Milk Sugar 1 in 10; that of Elaterin is the only example provided in U.S. *Vide* Index for Triturations prepared and their doses.

Levigations are ***Strength 1 in 50:—***

ℙ	Levigatio Aconitinæ	*Dose*	$\frac{1}{5}$	to	$\frac{5}{6}$	grains.
ℙ	Levigatio Hyoscinæ Hydrobromidi ..	,,	$\frac{1}{4}$	,,	$\frac{1}{2}$	,,
ℙ	Levigatio Hyoscyaminæ..	,,	$\frac{1}{2}$	,,	1	,,

TROCHISCI.

Lozenges are prepared with six different flavourings (*Off.*). Those with **Fruit Basis** are prepared with Black Currant paste, Sugar and Tragacanth, but are harder than the Fruit Lozenges of commerce—viz., Benzoic Acid (½ grain), Catechu (1 grain), Eucalyptus Gum (1

grain), Guaiacum Resin (3 grains), Extract of Krameria (1 grain), and ℞ Extract of Krameria (1 grain), combined with Cocaine Hydrochloride ($\frac{1}{20}$ grain).

Simple Basis.—Sugar 496, Gum Acacia 19½, Mucilage 35, Water *q.s.* Used in—Ipecacuanha (¼ grain), Reduced Iron (1 grain), and Santonin (1 grain).

Rose Basis is as above, but with addition of Otto. Used in—Compound Bismuth (Carbonate 2 grains), Potassium Chlorate (3 grains), and Sodium Bicarbonate (3 grains)—the last mentioned not now *Off.*

Tolu Basis contains Tolu Tincture 10, Water 10, Sugar 482, Gum Acacia 19½, Mucilage 35½, Water *q s.* Used in Acid Tannic (½ grain), Phenol (Carbolic Acid), (1 grain), (B.P.,'98) Ⓟ Morphine (Hydrochloride $\frac{1}{32}$ grain). and Ⓟ Morphine Hydrochloride ($\frac{1}{32}$ grain), with Ipecacuanha ($\frac{1}{10}$ grain).

Orange (Tincture) is used to flavour Sulphur Lozenges (5 grains).

Lemon Juice with Sugar, Acacia and Tragacanth is used for Phenol Lozenges *Off.* (½ grain).

In the index those with 'R' have Rose basis; 'S' have Simple Sugar basis; 'T' have Tolu basis; 'G' have Gelatin basis, and are the commonly sold **Pastils** or **Jujubes** of oval or round shape (the latter are frequently "sugared"). *Vide* also **Pastilli Glycogelatin.**

UNGUENTA.

The principal **Ointment Bases** are:—**Lard, Benzoated Lard,** and **Lard** with **Oleic Acid** (for Alkaloids); **Paraffin, Soft** (**White** or **Yellow**), and **Hard Paraffin,** and their combination **Paraffin Ointment** (**White** or **Yellow**); and **Wool Fat** (and **Hydrous**).

In addition Combinations of **Almond Oil, Beeswax** (**Yellow** and **White**), **Camphor, Glycerin, Olive Oil, Spermaceti,** and **Prepared Suet** and **Benzoated Suet** are ordered.

Unguentum Simplex (B.P., 1885) was composed of White Wax 2, Benzoated Lard 3, Almond Oil 3.

Palm Oil, Cocoanut Oil, Sodium Stearate are further suggestions for Ointment bases.

Goose Grease is quickly absorbed (*cf.* Anserine Mulls). Lanolin alone is absorbed very slowly, more ready when mixed with olive oil. The addition of a little cedar wood oil to an ointment increases absorption.

Lard and Olive Oil are absorbed to the extent of about 15% after two minutes rubbing. Hydrous Wool Fat is absorbed 20% providing proper amount of water is present—the results were obtained by rubbing 10 grains on to a skin area of 20 sq. inches and scraping off with a razor and weighing the amount not absorbed.—R. B. Wild, B.M.J. ii./13,983.

A basis of **Hydrous Wool Fat and Glycerin of Starch** is largely absorbed. It is relatively non-greasy.

Lassar's Paste (*q.v.*) forms an excellent *Protective Ointment,* as also does a mixture of Hydrous Wool Fat 1 with Soft Paraffin 3.

The Ointments of the B.P.—E. W. Lucas—C.D. i./12,262—for a brief Abstract see Unguentum Paraffini.

✱**Eucerin** (T.M. 297268, 297270) **Anhydrous.**—A mixture of 5 parts of Oxycholesterins from Wool Fat with 95 Paraffin Ointment. This with an equal quantity of Water gives 'Eucerin Purum' miscible with other salves, etc.—Gehe.

For other ointment bases *cf.* Crembas, Adeps Lanæ, Mulls, Mollin, etc.

UREA.

$CO(NH_2)_2$=60·053. *Syn.* CARBAMIDE.

Dose.—10 to 60 grains (**0·6 to 4·0 Gm.**), thrice daily, may be given in a mixture flavoured with lemon syrup. Hypodermically similar amount in sterile water. It forms colourless crystals.

Soluble 1 in 1 of water and in alcohol 90% about 1 in $7\frac{1}{2}$.

Urea is synthesised by acting on Phenyl Carbonate [$CO(O.C_6H_5)_2$=214·08] with Ammonia, the products of the reaction being Urea and Phenol. Phenyl Carbonate is made by passing Phosgene, *i.e.*, Carbonyl Chloride * into dilute Sodium Phenate solution). Wohler in the year 1828 succeeded in converting Ammonium Cyanate into Urea; it was the first animal product made by a purely chemical synthesis.

E. Werner holds that Urea is of the formula $\begin{matrix} HN:C.O \\ \diagdown\!\diagup \\ NH_3 \end{matrix}$

This brings it into relation with Ammonium Salts in general, and makes Cyanic Acid the most significant decomposition product. Urea is omnipresent, even in the lowest form of plant life.—B.M.J. i./23,1020.

It may also be obtained from Calcium Cyanamide by hydrolysing with 10% H_2SO_4 at 50° C.—P.J. i./16,45.

Uses.—Urea has diuretic properties and is given to some extent in gout and kidney disease. In the past it was given in phthisis.

It has marked bactericidal properties and has been suggested for use to wounds.

It is also used as a *kidney permeability test* in dose of $\frac{1}{2}$ ounce (15 Gm.), less for children. For the estimation of urea in urine *see Vol. II.*

Haustus Ureæ Composita (Urea Concentration Test) K.C.H.

Dose.—$3\frac{1}{2}$ ounces (**100 Cc.**).

Urea $4\frac{1}{2}$ drachms, Tincture of Orange 15 minims, Water to $3\frac{1}{2}$ ounces.

Thio-Urea. *Syn.* **Thiocarbamide** $CS(NH_2)_2$ = 76·113. Obtained by heating dry Ammonium Sulphocyanide in an enamelled vessel to 170° C. for an hour, then cool rapidly and extract the unaltered Sulphocyanide with cold strong Alcohol and crystallise the residue repeatedly from hot water. Crystals soluble 1 in 10 in water—with difficulty in Alcohol.

℗1 **Ureides.**—The substances in the designation ***"All Poisonous Uriedes"*** in the Order in Council leave uncertainty as to what are included. A Ureide is a compound of an Acyl (or Acidyl) radical with the residue of Urea thus :—

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* **Carbonyl Chloride** *Syn.* **Phosgene,** $COCl_2$ = 98·925.

A colourless gas with penetrating odour decomposed by water into hydrochloric acid and carbon dioxide.

Manufacture.—By warming a mixture of Potassium Dichromate 400 and Sulphuric Acid 3,200 in a vessel with reflux condenser and dropping in Chloroform 160 in small quantities at a time.

This was one of the early (and most dangerous) gases used in the war. The Treatment was venesection which was sometimes effectual. Warmth and stimulants required at the same time.

$NH_2CO.NH_2$ Urea. $NH_2CO.NH.CO.CH_3$ Ureide of Acetic Acid.

Analogous are the Amides to Ammonia :—

NH_3 Ammonia. $NH_2.CO.CH_3$ Amide of Acetic Acid.

When the Acyl radical is from a dibasic acid one H atom of each NH_2 may be replaced as in Barbituric Acid.

$$CO<\begin{matrix}NH—CO\\NH—CO\end{matrix}>CH_2$$

These are **Cyclic Ureides.** Some hold that only these are included in the resolution. **Adalin** and **Bromural** are Ureides but not cyclic. Whether they are now in the Schedule depends on whether they are included by the adjective 'Poison*ous*' but *N.B. Any Alkyl, Acyl or Metallic Derivative of Barbituric Acid is included in the Order, even if proved to be non-poisonous.*—B.M.J. i./13,836.

The name **Diureide** is usually given to bodies containing *two* urea residues, *e.g.* Uric Acid and Caffeine.

℗1 **Barbitonum** (*Off.*).—Malonurea. *Syn.* Diethyl-malonyl-urea. Diethyl-Barbituric Acid, P.G.V., Fr. Cx. Supp. 1920, P. Helv., P. Svec., P. Jap. IV., Malonal. ✱Hypnogen (T.M. 279688), Deba, Veronal.

Wholesale and retail vendors must label poison and treat otherwise as ℗1. (*Part I Poison since January,* 1918.)

$$\begin{matrix}C_2H_5\\C_2H_5\end{matrix}>C<\begin{matrix}CO.HN\\CO.HN\end{matrix}>CO \text{ or } C_8H_{12}N_2O_3=184{\cdot}152.$$

Dose.—5 to 10 grains (**0·3 to 0·6 Gm.**)—should be dissolved in hot water. *Bowels should be kept open and the kidneys in good working order.* P.G.V. Max. single dose **0·75 Gm.** max. per diem **1·5 Gm.** ; Fr. Cx. Supp. **0·5** and **1 Gm.** respectively.

Caution.—5 grains are sufficient for an ordinary case of insomnia. The symptoms of poisoning are—somnolence, unconsciousness, subsequently coma, cyanosis, cold extremities. 50 grains might be regarded as the average minimum fatal dose.—B.M.J. ii./13,1178.

This substance is no longer a British Patent. Numerous patents have been granted for making it, *e.g.*, 1664/1903, for the revocation of which an application was made in 1911 under Sec. 27 of the Patents and Designs Act, 1907, on the ground that the patent was only being worked outside the United Kingdom. The patent expired before the hearing came on. Another patent 14,014/1904, was however revoked. Further details.—C.D. May 15/15.

Manufactured by condensing Urea with the Diethyl ester of Malonic Acid as follows :—

The main reaction to be effected, according to the Patent Specification 1664 of 1903, is a condensation of Diethyl-Malonyl-diethylate with Sodium Ethylate and Urea. This could be indicated by the following equation :

$$(C_2H_5)_2.C.(COOC_2H_5)_2 + 2C_2H_5O.Na + CO(NH_2)_2 = (C_2H_5)_2C.(CONaN)_2CO + 4C_2H_5OH.$$

Malonic Acid is $CH_2(COOH)_2$.

From the patent example we take the following: Dissolve Sodium 3 in Absolute Alcohol 600 (weight), and after cooling add Diethyl Malonic Ethyl ester 100 (weight) and Urea in fine powder 40. Dissolve with gentle heating. The formation of Sodium Diethyl Barbiturate commences

after a short time, but it is better to heat in an autoclave to 100–110° C. for 4 to 5 hours. During the process the Sodium Compound is precipitated mixed with a little Sodium Carbonate. After cooling the whole is filtered. The alcoholic mother liquor after again heating to the same temperature yields a further supply of the same product. Both yields are dissolved in water and decomposed by Hydrochloric Acid. The acid body is recrystallised from hot water.

Dorvault states Veronal is obtained by warming on the water bath 9 parts Diethyl Malonic Acid with 6 parts of Urea and 6 parts of Phosphorus Oxychloride. Hydrochloric Acid is evolved and Phosphoric Acid is formed. Wash with a little cold water and crystallise the residue from boiling water.

For either method it will be seen that Diethyl Malonic Acid is required in the first method in the form of the Diethylate. The acid is in fact made from its ethyl ester.

Diethyl Malonate is prepared by dissolving Monochloracetic Acid 50 Gm. in water 100 Cc., neutralising with Potassium Carbonate 38 Gm., adding Potassium Cyanide 38 Gm., and heating on a sand bath until reaction sets in. When the reaction is over evaporate rapidly with constant stirring until the thermometer registers 135° C. in the semi-liquid mass. Allow to cool, powder and introduce into a vessel with an upright condenser. Add two thirds of its weight of Absolute Alcohol and whilst heating on the water bath pass in dry Hydrochloric Acid gas for ten hours. Then cool and extract with Ether 150 Cc., shake the ethereal solution with a little dilute Potassium Carbonate solution, dehydrate with Calcium Chloride and distil. The Diethyl Malonate distils at 195° C.—J. B. Cohen, Practical Organic Chem., 1900.

Diethyl Malonic Diethyl Ester. Sodium Ethylate is formed by dissolving Sodium 5 Gm. in 50 Gm. Absolute Alcohol, and whilst still warm 16 Gm. Diethyl Malonate are added; after a while the whole goes solid, then 40 Gm. Ethyl Iodide are added, and when the mass completely dissolves it is heated on the water bath until the liquid ceases to be alkaline.

The Alcohol is distilled off in a brine bath, the ester is extracted by ether dehydrated with Calcium Chloride and distilled. Boiling point 223° C. Sp. Gr. 0·990.

This is the process for Monoethyl Malonic Ester as described in Cohen as modified, *i.e.*, double quantities of Sodium Ethylate and Ethyl Iodide. See also E. Fischer, Annalen der Chemie, 335 (1904), 334.

A white crystalline powder melting at 191° C., ***Soluble*** 1 in 145 water at 20° C., and about 1 in 9 of alcohol 90%, more soluble in hot water, and in alkaline solutions. *Boiling* with alkalis decomposes it. In Ether, 1 in 25. It is also soluble in Acetone and Acetic Ether. In Chloroform 1 in 35—by our experiments. Should dissolve in Sulphuric Acid without colouration and not cause colouration on shaking with Nitric Acid (organic impurities).—P.G.

Uses.—Has a soporific action indicated in nervous restlessness, insomnia and depression, for maniacs and in cardiac troubles. Does not affect temperature or respiration. May cause erythema. Produces sleep without subsequent depression.—Cushny, 192. Tolerance to Veronal may be established in some cases.

In insomnia arising from pain 4 grains may be usefully combined with Atropine Methyl Bromide $\frac{1}{64}$ grain.

℞ **Malourea Tablets**, 5, 8 or 10 grains, or in Cachets. (*Caution*: for dose *v.* above).

℞ **Suppositories** 4 to 8 grains (**0·25 to 0·5 Gm.**).

Poisoning Effects.

A case of gangrene of the skin following a large dose of Veronal and Pyramidon.—L. ii./11,479.

Hemiplegia caused by Veronal in aged persons.—B.M.J. ii./10,375.

Veronal has the peculiar property of counteracting unpleasant effect of morphine.—L. ii./08,1223.

Veronal owes activity to Ethyl groupings—this body is more powerful than the corresponding Methyl Compound, whilst Proponal (*infra*) possesses the maximum activity in the group.—B.M.J. i./09,554.

The number of deaths from Veronal have been more in one year than from Patent Medicines in a century.—Parry, P.M.C.E., C.D. i./13,600.

Trevanion Case.—Patient must have taken 21 × 7½ grain Cachets within an hour. 150 grains were found on exhuming and examining remains. Could not have been taken accidentally.—P.J. i./13,77,148.

Antidotes.

Stomach pump, lavage and enemata. Coffee, Strychnine, later diuretics.

Treatment of acute Veronal Poisoning. If *within* 4 *hours* of taking the drug repeated lavage of the stomach with warm water, then introduce through the stomach tube a pint of hot strong coffee with some milk in it and an ounce of Castor Oil.

If patient is seen 6 *hours or so after taking the drug* the poison has passed into the intestine, but rapid washing out of the stomach and giving coffee may still be advised, unless patient is *in extremis.* Other measures—cardiac stimulants (Strychnine 1/30 grain with Digitalin 1/100 grain every 4 hours) warm Normal Saline subcutaneously, rectal injection of 15 oz. of Normal Saline containing 4% Glucose. If much cyanosis Oxygen. If pulse feeble Oxygen should be passed through a wash bottle of Absolute Alcohol. If urine is not freely excreted give Caffeine hypodermically. The coma may last several days—feeding, therefore, necessary with warm milk and coffee every 4 hours—either by stomach or nasal tube carefully passed.—W. H. Willcox, L. ii./13,1178; Inter. Cong. Med., Aug., 1913.

Tests and Toxicological Analysis in case of Veronal Poisoning.—See Vol. II.; Org. Anal. Chart and Corroborative Tests.

Review of hypnotic drugs, Chloral bodies, Sulphone Compounds, Ureides, and other bodies with allied effects.—W. H. Wilcox, B.M.J. ii./13,661.

A case with recovery after 125 grains. Patient remained unconscious from March 8th until the 11th, when he was brought round by lavage with Potassium Permanganate Solution, Strychnine hypodermically 1/40 grain every six hours and rectal feeding.—L i./13,917

Veronal 92½ grains taken with poisoning symptoms by a retired prize-fighter. Recovery. Treatment hypodermically Strychnine and Digitalin, stomach pump, lavage with weak Sodium Bicarbonate (tube passed with difficulty after warming and oiling it). Half pint strong black coffee and 2 ozs. brandy passed in, later hypodermic injections of Camphor Liniment (20 minim injections) every ¼ hour (latter valuable,—keeps the heart going and overdose is impossible) and more Strychnine.—B.M.J. i./13,280.

Effects of 56 grains taken to relieve headache. Recovery after 4 days.—G. Newton-Pitt, L. i./13,412.

Another case, non-fatal after taking 125 grains in one dose, according to the patient. Treatment, lavage with dilute Permanganate; Atropine Sulphate 1/50th grain hypodermically repeated twice within two hours. The stomach washing was probably useless as absorption had presumably already occurred, yet he returned to consciousness after four days.—B.M.J ii./13,20.

Veronal taken regularly produces grave disorders of the nervous system. In addition there is a deterioration of the moral sense as in Morphine and Cocaine habit, hence a reckless use of the drug may result.—B.M.J. i./13,566.

Veronal (and Luminal) RASHES.—Veronal should not be used in skin cases, especially of the bulbous type. Erythematous rash (in some areas it was sheet-like as result of coalescence) after Luminal, 3 grains a day.—G. Pernet, B.M.J. ii./13,312.

Veronal poisoning—fatal case. Recovery of the drug from tissues and urine.—B.M.J. i./14,853. A case of recovery from 125 grains *ibid.* 854, and after 35 grains *ibid.* 856, and after 100 grains *ibid.* 1015.

For several earlier references to poisoning by this hypnotic *vide* Edn. XV., p. 779.

℗1 **Veronal-Sodium.** *Syn.* ✱MEDINAL (T.M. 304403). $C_8H_{11}NaN_2O_3$ =206·144.

Dose.—5 to 10 grains in a little water, 3 to 4 hours after last meal. In most cases 5 grains is sufficient for an adult.

Wholesale and retail vendors must label "Poison" and treat otherwise as ℗1.

PATENT 19,411/1904 and 2566/1905 became void in 1913.

Manufacture.—Rub down Diethylbarbituric Acid 184 Gm. in a mortar with about 200 Cc. of water and then add Sodium Hydroxide pure 40 Gm. previously dissolved in water *q.s.* and *estimated*. It should be as free from CO_2 as possible. Evaporate to dryness on water bath. It may be regarded as an acid salt. One would have expected a *Di*-Sodium compound. We found that, commencing with a proportion of alkali sufficient to make the Di-Sodium body, decomposition sets in on drying.

White crystals soluble 1 in 5 in cold water. Suitable for internal or rectal injection. Is stated to be useful in seasickness.

Hypnotic effect of Medinal is best obtained by the use of Suppositories medicated with 0·4—0·5 Gm. Administration by the mouth only on empty stomach.

Even small doses, *e.g.*, 1 grain three times a day, in some instances produce a lengthy sleep—at night.

Sea-sickness. Veronal 8 grains or Sodium Veronal which acts faster taken on board is valuable.—T. Zangger, L. ii./21,630.

✱**Veronigen** (T.M. 374804). *Dose.*—1 drachm (**4 Cc.**) diluted about one hour before going to bed. For nervous sleeplessness in children 10 to 20 minims diluted. A liquid preparation of Veronal as hypnotic.

Neurinase. *Dose.*—(As hypnotic or sedative) 1 drachm (**4 Cc.**) in the morning and 1 to 4 drachms (**4 to 15 Cc.**) at bedtime. 1 drachm contains 2½ grains approximately (0·15 Gm.) of Veronal.

A preparation of Veronal with Valerian suggested for use in nervous insomnia and neurasthenia.

℗1 **Chineonal** is QUININE DIETHYL BARBITURATE.

Dose.—10 grains (**0·6 Gm.**) for adults, in fevers, neuralgia, etc.

✱**Planadalin*** (T.M. 409581). *Syn.* URADAL, BROMODIETHYL-ACETYL-UREA, ✱ADALIN, NYCTAL.

$$\begin{matrix} C_2H_5 \\ C_2H_5 \end{matrix}\!\!>\!C\!<\!\!\begin{matrix} Br. \\ CO.NH.CO.NH_2 \end{matrix} \quad =237·075.$$

Patent 2888/1910. T.M. 325352 ("Adalin") was suspended under 1914 Regulations in favour of two British firms, but reverted to original owners in 1921. Further details last Edn., p. 756.

Dose.—As sedative 5 to 10 grains (**0·3 to 0·6 Gm.**) *t.d.s.*; as hypnotic 10 to 15 grains (**0·6 to 1·0 Gm.**) followed by hot drink half an hour before bedtime. Tablets, 5 grains each.

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* Whether this compound is ℗1 or not, depends on the meaning of the word "Poisonous" *cf.*, Ureides, p. 790, and P.J. i./13,549; B.M.J. i./13,662,836.

C. D. March 15/13, p. 421, says it is not a ureide. It is regarded as an open chain compound, while it can be said to be not a derivative of diethylbarbituric acid. The same remarks apply to Bromural. C.D. says they cannot be designated poisonous. Our own opinion on the matter is that chemists should err on the side of caution.

Tasteless crystalline powder. M.pt. 115°—116° C. Soluble 1 in 5,000 water. A hypnotic of medium strength. The cyclic structure of the u derivative of Diethyl Malonic Acid (Veronal) according to E. Fischer ma it a much more powerful hypnotic than Diethyl Acetic Acid, of which Ada may be looked upon as a derivative.—B.M.J. ii./13,48.

℗1 **Proponal.** *Syn.*—Dipropyl-Barbituric Acid.

$(C_3H_7)_2C(CO.NH)_2CO = 212{\cdot}194$.

Dose.—2 to 8 grains (**0·12 to 0·5 Gm.**). ℗1 **Tablets** 1½ grai

Wholesale and Retail Vendors must label "Poison" and treat othe wise as ℗1.

Manufacture.—Probably made under the Veronal patents (expire but no licence was registered at the British Patent Office.—C. D.

A homologue of Veronal in white crystalline powder, as hypnot very slightly soluble in water, more so in Alcohol. It is readily d solved by alkalis—hence probably acts on reaching the intesti

Very narrow margin between therapeutic and toxic dose. *Whi 5 to 6 grains are hypnotic, 7½ grains approximates danger zone.*

More poisonous than Veronal.—W. H. Willcox, L. ii./13,1180.

* ℗1 **Sonéryl** (T.M. 432474) *Syn.* Butyl-Ethyl-Barbitur Acid.

$$\begin{matrix} C_4H_9 \\ C_2H_5 \end{matrix} > C < \begin{matrix} CO-NH \\ CO-NH \end{matrix} > CO = 212{\cdot}194$$

Dose.—1½ grains (**0·1 Gm.**) produces sleep in half an hour. It may be give at any time, but in no case less than ½ hour after food. A larger dose, *e.* 3 grains (**0·2 Gm.**) gives a deep sleep lasting some time. In pain from woun 3 to 4 grains may be used. In delirium 2 grains. *Max.* in 24 hours, 4 grain **Tablets** 1 grain are made.

A white, crystalline powder with slight bitter taste. Soluble 1 in 300 water. Said to be three times as active an hypnotic as Veronal.

For *rectal use* **Suppositories** 0·1 Gm. *Subcutaneously*, a **Piperazi** compound, containing 0·05 Gm. (of the compound) in each Cc., is used. *I trave nously*, 0·1 Gm. in 20 Cc. of Normal Saline.

Ithas not the toxicity of Morphine and is not habit-forming.—P.J. i./23,17

Dormigene (T.M. 367615). *Bromural (T.M. 284555). *Syn* ***a*-Brom-iso-Valerianyl Urea.**

$(CH_3)_2CH.CHBr.CO.NH.CONH_2 = 223{\cdot}054$.

Patent 942/1907. On application by a British firm, June 21/16, is mad in this country under licence. It may be prepared by condensing the chlorid of *a*-Brom-iso-Valeric Acid with Urea:

$(CH_3)_2CH.CHBrCOCl + (NH_2)_2CO = (CH_3)_2CH.CHBrCO.NH.CO.NH_2 + HC$

Dose.—5 to 10 grains (**0·3 to 0·6 Gm.**).

Colourless crystals, soluble with difficulty in water, dissolved by Causti Soda and precipitated by acids from its solution in alkali. Melting poin about 145° C. Contains about 36% Bromine. Is said to induce sleep whic commences in from 5 to 25 minutes after taking and lasts from 4 to 5 hours, a the expiration of which natural sleep follows, the action of the drug havin ceased in that time.—B.M.J.E. i./07,75.—B.M.J. i./09,554.—L. ii./08,1223.

Tablets contain 5 grains (0·3 Gm.).

This and Adalin cause a diminution in blood pressure, but are witho effect on the heart,—experiments on rabbits. Adalin is the more lethal.— J.C.S.A. i./13,1023.

℗1 * **Allonal** (T.M. 428271). A combination of Allyl-isopropyl-Barbitur Acid 1 grain and Amidopyrin 1⅔ grains, in tablets.

Dose.—1 to 2 tablets as sedative or hypnotic in simple cases of insomnia 2 to 4 as analgesic and hypnotic. 'Worked better than Morphine.'—M. A Burns, N.Y. Med. Jl., Apl. 19,22.

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* This is a Ureide and may be ℗1 *cf.*, Ureides, p. 790 and footnote to p. 793

℗1 **Dial.** (*Dial-Ciba T.M. 358,718.) *Syn.* **Diallyl-Barbituric Acid.**

$$(C_3H_5)_2C<\begin{matrix}CO.NH\\CO.NH\end{matrix}>CO=226{\cdot}142.$$

A further homologue of Veronal employed as hypnotic. **Tablets** contain 1½ grains. Dose one half to three tablets in water.

Insomnia well treated by di-allyl-barbituric acid—a tablet on the tongue with a salt spoon of cognac emulsifies and is easily taken. Preferable to hypnotics. It is relatively assimilated while the diethyl compound is passed to the extent of 80% as such!—Watson Smith, P.J. i./18,219.

***Dialacetin** (T.M. 379525). Compound of Dial with Allyl Paracetaminophenol; hypnotic and antineuralgic, analgesic and antipyretic.—M.P.C. May 2/22,362.

*℗1 **Luminal** (T.M. 337916).—Phenyl-Ethyl-Barbituric Acid.

* **Gardenal** (T.M. 412226) is stated to be the French equivalent of Luminal.

$$\begin{matrix}C_6H_5\\C_2H_5\end{matrix}>C\begin{matrix}CO.HN\\CO.HN\end{matrix}>CO=232{\cdot}172.$$

Wholesale and retail vendors must label "Poison" and treat otherwise as ℗1.

Dose.—In simple insomnia 1½ to 5 grains (**0·1 to 0·3 Gm.**) dissolved in hot water, where there is excitement 5 to 6 grains up to 12 grains (**0·8 Gm.**)—latter is *maximum dose.*

A modification of Veronal, an Ethyl group being replaced by a Phenyl radical hence the action is intensified. White powder with slight bitter taste, almost insoluble in water. ***Soluble*** in Alcohol 90% 1 in 15, Ether 1 in 40, Chloroform 1 in 50—by our experiments.

Uses.—Hypnotic in conditions of excitement, in sleeplessness associated with pain, in mental conditions, etc. Bowels to be kept open and kidneys in good working order.

℗1 ***Luminal-Sodium.**—Readily soluble in cold water and is used hypodermically in alcholic and mental cases.

Hypodermic Injection 20 per cent. is used.

Dose for men 2½ to 3 Cc. (=8 to 10 grains); for women 2 to 2½ Cc. (=6½ to 8 grains). The solution should be prepared with cooled boiled water, and may be kept for 1 to 2 weeks.

Luminal is more poisonous than Veronal.—W. H. Willcox, L. ii./13,1180.

Epilepsy. 125 cases compared under Sodium Luminal and Bromide. Patients with diurnal fits whilst under Bromide showed marked reduction of number of fits under Luminal. Patients felt brighter than when taking bromides. One showed no improvement—another became worse. Cases with more than four fits a month also showed improvement but not so marked, and so on. Out of the total 125, 35 were either not improved or deteriorated while the remainder did better under Luminal than under Bromide. The cases least affected were those whose fits occurred in bouts at considerable intervals. A class of epileptics probably exists who are more refractory to bromide treatment than others. Dose used, 6 grains a day of the Sodium salt. It would be converted into the acid by the acidity of the gastric juice. Giddiness and drowsiness sometimes observed. No signs of formation of habit.—F. Golla, B.M.J. ii./21,320.

Epilepsy. Given in solution with hot milk or water, in doses of one or two grains once a day, usually at bedtime. Continental observers consider 3

to 4½ grains can safely be given to adults over prolonged periods provide patients are under adequate supervision. Reduction in fit incidence an increase in weight. The substance seems to give best results in cases c major epileptic attacks.—J. Tylor Fox, L. ii./21,558.

Some say it is at best a palliative and not a specific.—Jl. A.M.A., Aug./2 588; Pres., Feb./21,67.

The close relationship of true migraine to epilepsy as one of the paroxysma neuroses resembling epilepsy in being preceded often by an aura and succeede by violent headache, suggested prolonged Bromide treatment in the pas Bromide failed in migraine, and in a few cases Aspirin, and in other Pyramidon (gr. vii.) with Cannabin Tannate (gr. iii.) cut short the duratio of the headache. True migraine, which in its characteristic type is notabl hereditary, has been treated with best success by Luminal. The dose, a a rule, should not be more than ¾ grain thrice daily at first, reduced to twic daily after a fortnight if the result is good, and later to once daily at bedtim After a week various cutaneous rashes may be seen, but are unlikely if th above dosage is not exceeded.—Wilfred Harris, B.M.J. ii./22,786. See als R. Hearn, B.M.J. ii./22,893.

Luminal is *in*soluble in water yet *physiologically active*. Used in epileps of varied types even where large doses have to be given in an attempt t influence forms of mid-brain tremor—with good effect.—W. Johnson, I ii./22,275. To give more than 4 or 5 grains a day, in general, is to ask fo toxic effects.—*ibid.*, 288.

While it acts on the convulsive element, it strikes too strongly. It arres seizures but also checks normal play of the nerve centres and is liable t produce a physical and mental torpor. L. Cheinisse, La Presse Medical Jan. 14/22, see also Ther. Gazette, Dec. 21—the drug thought not to curc prolonged use dangerous and withdrawal requires care.—C. D., June 17, 192 p. 66.

Epilepsy treated. Admirable in cases of convulsions; lessens number attacks, and in some cases stops them completely. Reputed danger in sudde suppression of Luminal greatly exaggerated. Depression and other complica tions following use due to administration of too strong doses—doses var according to age of patient and intensity of malady.—B. Conos, La Grè Médicale, July—Aug., 22, per Jl. Trop. Med. Dec. 1/22,383.

Most effective symptomatic remedy, best in convulsive types. Indi criminate use dangerous—never more than 1½ grains to start.—J.A.M.A Sept. 22,788. As palliative superior to bromides. Should be discontinue gradually.—per Pres., Jan. 23,23. Toxic effects following use.—J.A.M.A Apl. 22,1199; per Pres., Jan. 23,23.

URETHANE.

ℙ1 *All "Poisonous" Urethanes*. Wholesale and retail vendor must label "Poison" and treat otherwise as* ℙ1.

$CO(OC_2H_5)NH_2 = 89{\cdot}079$. *Syn.*—**Ethyl Carbamate,** Fr. Cx *Dose.*—10 to 60 grains (**0·6 to 4 Gm.**). **Tablets**, 5 grains (**0·3 Gm.**)

Colourless prismatic crystals, inodorous, with saline taste.

Manufacture.—By heating several hours in an autoclave or meta tubes, Urea Nitrate in excess of Absolute Alcohol at 120 to 130° C. and ex tracting first with water and this solution with Ether several times, Ammoniu Nitrate is formed. Distil to rectify (B.pt. 180° C. without decomposition $CO(NH_2)_2.HNO_3 + C_2H_5OH = NH_4NO_3 + CO(OC_2H_5)NH_2$—Bunte Zeit. Chem., A. 151,181.

Incompatible with Caustic Alkalis and with Acids. ***Solubl*** 1 in 2 of Water; 1 in 1 of Alcohol 90%. Fr. Cx. states 1 in 1 of Wate and 1 in 0·6 of Alcohol (95%).

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* There is vagueness in the wording of the Order in Council. Th word '*poisonous*' leaves it to be decided in any given case whether a com pound comes under the description or not.—B.M.J. i/13,836.

Uses.—Hypnotic, produces normal sleep, the heart is not affected; especially suitable for children; in cases of delirium tremens, and in acute mania and tetanus.

Quinine Urethane (Hydrochloride). *Dose.*—½ to 3 grains **(0·03 to 0·2 Gm.)**

Employed hypodermically, as it is non-irritating.

Is obtained by heating Quinine Hydrochloride 3 with Urethane 15 and Water 3 parts.—P.J. ii./02,273.

Urethane injected hypodermically into animals is said to produce complete insensibility to pain so that any operation can be performed with perfect safety. It is said not to cause heart failure or sickness.—From *The Times* per P.J. i./14, p. 393.

Malarial coma. The only treatment found of value was Quinine Hydrochloride 0·4 Gm. with Urethane 0·2 Gm. in 15 Cc. Normal Saline intravenously; also valuable for persistent fever and chronic forms of malaria. Painless. Intramuscularly not advised.—Richet and W. B. Griffin. B.M.J. i./17,190.

VALERIANÆ RHIZOMA (*Off.*), U.S.

The dried rhizoma and roots of *Valeriana officinalis* and of *V. Wallichii* (**V. Indica**), (*Valerianaceæ*), collected in the autumn, contains volatile oil and two alkaloids.

If the enzyme it contains, be killed by stabilising before drying, the root only develops a small degree of the typical odour. Either fresh Valerian or the stabilised article said to be best clinically.—Prof. van der Wielen, C.D. ii./16.911.

Cultivation. The growing plant has slight odour of meadow sweet.—R. Glode Guyer, P.J. i./21,190.

History and therapeutic properties of Valerian.—N. Smodlaka, P.J. ii./21, 402.

Alcoonature Stabilisée. The late Prof. Bourquelot suggested a preparation (and a series of such preparations) for the next edition of the French Codex to retain the natural constituents of the drug.—C.D., Aug. 5/22,208.

Extractum Valerianæ Liquidum. 1=1 Hydro-alcoholic. *Average dose.*—30 minims (**2 Cc.**). **Extractum Valerianæ.** *Dose.*—1 to 5 grains (**0·06 to 0·3 Gm.**). is made by concentrating this.

Mistura Valerianæ Composita, R.F.H.—Tincture of Valerian 3, Fœtid Spirit of Ammonia 2, Camphor Water to 48.

Oleum Valerianæ. *Dose.*—1 to 5 minims (**0·06 to 0·3 Cc.**). Yellowish colour. Sp. Gr. 0·94. In flatulence and nerve complaints.

Tinctura Valerianæ Ammoniata (*Off.*). 1 in 5. *Dose.*—½ to 1 drachm (2 to 4 Cc.). U.S. 1 in 5 of Sal Volatile. An antispasmodic and nervine tonic.

Flavoring.—Glyl Coriandri, Glyl Menthæ Piperitæ, Syrupus Zingiberis, Extractum Glycyrrhizæ Liquidum, Tinctura Carminativa. **Tinctura Valerianæ, U.S.**

Average dose.—1 drachm. 1 in 5 of a mixture of Alcohol (94·9% Vol.) and Water in proportion of 3 to 1.

Acidum Valerianicum, Fr. Cx., P. Helv. *Dose.*—1 to 5 minims (**0·06 to 0·3 Cc.**), in syrup or in gelatin capsules. Consists principally of optically inactive Isovalerianic Acid $(CH_3)_2.CH.CH_2.COOH$,

with more or less dextrorotary Methyl-Ethyl Acetic Acid $(C_2H_5)(CH_3)-CH=COOH=102{\cdot}11$.

An oily liquid, Sp. Gr. about 0·93. Given in hysteria and nervous affections.

Ferri Valerianas. $Fe_2(C_5H_9O_2)_2(OH)_4=381{\cdot}906$.

Dose.—3 to 15 grains (**0·2 to 1 Gm.**).

A nervine stimulant and emmenagogue, and is used in anæmia

Sodii Valerianas. $C_5H_9O_2Na=124{\cdot}097$.

Dose.—1 to 5 grains (**0·06 to 0·3 Gm.**).

In white crystals ; used as a nervine sedative.

Zinci Valerianas. ZINCI VALERAS, U.S.

$(C_4H_9COO)_2Zn=267{\cdot}564$. (*Off.* and U.S.$+2H_2O$).

Dose.—1 to 3 grains (**0·06 to 0·2 Gm.**).

White powder or in pearly crystals, very slightly soluble in water Soluble in alcohol. Pills 3 grains each.

This is given as a nerve and general tonic, *e.g.*, after hay fever and as prophylactic, but pharmacologists say it has no efficacy.

Incompatible.—Acids and metallic salts. (*See also* zinc salts.

Amyl Valerianate. Iso-valerianic Iso-amyl Ester.

$C_5H_{11}.C_5H_9O_2=172{\cdot}21$. *Dose.*—2 to 5 minims (**0·12 to 0·3 Cc.** in capsules or diluted in alcohol.

A mobile liquid, Specific Gravity 0·858. Miscible with Alcohol Is employed as a sedative and antispasmodic. Has been recommended as gall-stone solvent. In trade is known as 'Apple Essence.'

Borneol-isovalerianate. *Syn.* HYSTEROL.

Gelatin capsules contain 4 grains. A valerian substitute. In neurasthenia hysteria, etc. The action of Borneol is to diminish reflex irritability while valerianic acid acts as antispasmodic. Best taken after meals to prevent eructations.

Valérobromine. A specialty for use in nervous affections in 2 forms : '**Liquid.**' *Average Dose.*—2 to 6 drachms ; **Capsules** coated with gluten to dissolve in the intestine. *Average dose*—4 to 12 capsules *pro die.*

℞ ℙ ***Trivalin** (T.M. 340917).—*Dose per os* 8 minims (**0·5 Cc.**), *hypodermically* 8 to 15 minims (**½ to 1 Cc.**), ounce to 3 times daily.

A solution of Valerianic Acid with Morphine Valerianate 1/3 grain (0·02 Gm.) Caffeine Valerianate 1/18 grain (0·0037 Gm.), Cocaine Valerianate 1/12 grain (0·005 Gm.), in 1 Cc. Said to have the therapeutic effects of Morphine without disadvantages. Anodyne, *e.g.*, in painful dressings inoperable cancer, gall-stone, colic, and neuralgia. As tonic in delirium mania and hysteria.

℞ ℙ **Tablets** are made = ½ Cc. of the above.

The combination is in the proportion of one molecule each Caffein Valerianate and Cocaine Valerianate and 4 molecules Morphine Valerianate Overlach made a study of the combination of drugs to bring out and intensify beneficial action of each.

℞ ℙ **Trivalin** is made in combination with **Hyoscine Valerianate** 1/115th grain (0·00056 Gm.) per Cc., for treatment of the insane. *Dose.*—0·25 to 0·5 Cc.

Commercial Valerianates estimated by distillation using Sodium Acid Sulphate. Menthyl Valerianate requires hydrolysis first.—H. D. Richmond and W. T. T. Ainsworth B.P. Conf. 1919.

ZINCUM.

Zn=65·37.

To prepare **Arsenic-free** melt in a clay crucible and add about 15 grains of Sodium to a pound in small bits at intervals. Remove the scum, avoiding iron implements, and repeat in another clean crucible. Granulate by pouring into water when almost solidified.

Incompatibilities of Zinc Salts.—Alkaline carbonates, and alkalis in general, vegetable infusions and milk.

Antidotes.—Alkaline Carbonates in warm water, Demulcents, Milk and Egg, Tea and Tannin solutions.

Zinci Acetas.

$(CH_3COO)_2Zn.\ 3H_2O=237·486$. *Off.* and U.S. have $2H_2O$.

Dose.—1 to 2 grains (**0·06 to 0·12 Gm.**) as a nervine tonic, but phamacologists have no evidence of its utility. 10 grains for an emetic dose.

White crystals with faint acetous odour. Soluble in water 1 in 2·5, about 1 in 40 of alcohol 90%. Used as astringent lotion ($\frac{1}{4}$ to 1%).

Zinci Benzoas. $Zn(C_6H_5.COO)_2=307·52$.

White powder, soluble in water. Examination of.—P.J. ii./13,686.

Zinci Bromidum, $ZnBr_2=225·21$.

Dose.—2 to 5 grains (**0·12 to 0·3 Gm.**) in water.

White deliquescent powder. A little dilute hydrobromic acid will make a clear solution. Incompatible with alkaloids and salts of heavy metals. Has been used with success in epilepsy.

Zinc Carbonas.

$ZnCO_3.(ZnH_2O_2)_2,H_2O=342·163$.

Employed for tender surfaces, and to check perspiration.

Ⓟ **Zinci Chloridum.** (*Off.*). $ZnCl_2=136·29$.

Ⓟ *Zinc Chloride and liquid preparations of Zinc Chloride except preparations intended for soldering or other industrial purpose, provided they are contained in closed vessels labelled "Poisonous," and bearing the name and address of the seller and the special purpose.*

In deliquescent masses soluble 1 in 0·34 of water.

Ⓟ **Causticum Zinci Chloridi.**

Zinc Chloride 4, Solution of Antimony Chloride 2, Starch 1, Glycerin *q.s.*

Ⓟ **Collodium Zinci Chloridi.** 1 in 6 of collodion.

Ⓟ **Collutorium Astringens, R.D.H.**

Zinc Chloride 2 grains, Zinc Sulphate 1 grain, Water to 1 ounce.

Ⓟ **Guttæ Zinci Chloridi, R.O.H.** 0·125, 0·25 or 0·5% and 🅁 [P] 1 0·25 or 0·5 with Cocaine Hydrochloride 2% (St. Th. H. 0·125 to 0·25).

Ⓟ **Guttæ Zinci Chloridi cum Adrenalin, R.O.H.**

Zinc Chloride 0·25, Adrenalin Solution (1 in 1,000) 12, Chloretone 0·5, Sterilised Distilled Water to 100.

Ⓟ **Guttæ Zinci Chloridi (Aural) R.N.H.** Zinc Chloride 4 grains, Glycerin 2 drachms, Alcohol (90%) to 1 ounce.

Ⓟ **Liquor Zinci Chloridi** (*Off.*). Sp. Gr. 1·530.

Four minims of this solution=3 grains of solid Zinc Chloride. On diluting, a trace of hydrochloric acid will be necessary to clear it.

Uses.—A powerful odourless caustic, antiseptic, and anti-putrescent. The liquor is a strong deodorising antiseptic solution; it is

very poisonous. Ten grains to the ounce of water may be used as a stimulant lotion to wounds and ulcers. Also used as **Paste** with Starch and Glycerin.

In the treatment of erosion of teeth is useful to touch painful spots, or the addition of a little to Chloroform-Mastich forms a useful paint.—Smale and Colyer.

℗ **Lotio Zinci Chloridi,** R.O.H., 0·12 or 0·25%.

For wounds Zinc Chloride solution 40 grains to the ounce was much favoured by Lord Lister. Prevents the occurrence of putrefaction in spite of access of septic material. Importance of free drainage.—G. T. Beatson, L. ii./15,1214

℗ **Injectio Zinci Chloridi, L.H.** for vaginal use.

Zinc Chloride 5 grains, Water to 1 pint, *i.e.* 0·06% or 1 in 1,600 in round numbers.

Zinci Citras. $[C_3H_4(OH).(COO)_3]_2Zn_3+2H_2O=610·282$.

Dose.—3 to 12 grains (**0·2 to 0·8 Gm**). White powder with metallic taste, not perfectly soluble in water. Has been used for epilepsy.

ℙ1 **Zinci Cyanidum.** $Zn(CN)_2=117·396$.

An insoluble white powder with antiseptic properties.

Cf. **Mercuro-Zinc Cyanide.**

ℙ1 **Zinci et Potassii Cyanidum.** $Zn(CN)_2.2KCN=247·622$.

Dose.—$\frac{1}{10}$ to 1 grain (**0·006 to 0·06 Gm.**).

A soluble cyanide, possessing the properties of hydrocyanic acid.

Zinci Iodidum. $ZnI_2=319·21$.

Average dose.—1 grain (**0·06 Gm.**).

A white deliquescent powder turning brown on exposure. For cerebral, spinal, and nervous diseases in the third stage of syphilis.

Zinci Lactas. $(C_2H_4.OH.COO)_2Zn,\ 3H_2O=297·558$.

Dose.—$\frac{1}{2}$ to 3 grains. (**0·03 to 0·2 Gm**). Max. *pro die* 10 grains. (Has been used in France up to 3 Gm. for a dose!—Dorvault).

White crystals soluble 1 in 60 of water. In epilepsy.

Zinci Oxidum, Zinc Oxide. $ZnO=81·37$.

Dose.—3 to 10 grains (**0·2 to 0·65 Gm.**). **Tablets,** 2 grains.

Has been used for nervous debility, migraine, hysteria, *cf.* Zinc Acetate.

Mistura Zinci Oxidi E.L.

Zinc Oxide 1 grain, Glycerin 10 minims, Water to 1 drachm, for children.

Mistura Zinci Oxidi cum Opio, E.L. contains Tincture of Opium $\frac{1}{2}$ minim in 1 drachm of the above.

Unguentum Zinci (*Off.*). Zinc Oxide 15% in Benzoated Lard.

Unguentum Wilsoni. *Syn.* WILSON'S OINTMENT. P. JAP. IV.

Zinc Oxide 5, Benzoic Acid 1, Lard 30.

Unguentum Zinci Carbolisatum. Zinc Oxide 10, Phenol 2, Soft Paraffin 88. Dermatitis is well treated with this.

Unguentum Zinci cum Acido Salicylico.

Salicylic Acid 40 grains, Zinc Ointment 1 ounce, Soft Paraffin ounce.

Vaselinum Zinci Oxidi. Zinc Oxide 1, White Vaseline 9. For surgical use starch is sometimes added, *cf.*, Pasta Zinci cum Amylo

Cremor Zinci.

Zinc Oxide 3, White Vaseline 17, Perfume *q.s.*—For nursery use.

Cremor Zinci, St. M.'s H. (*Old formula, now altered.*)

Dissolve Lanolin 3 in Olive Oil 8 by heat, sift Zinc Oxide 8 into the mixture and whip up with Lime Water 8. Useful in acute eczema (drying stage) where there is much redness.

Cremor Zinci et Calaminæ, V.H.C.

Prepared Calamine 1, Zinc Oxide 1, Lime Water 4, Almond Oil 4.

Gelatinum Zinci. Unna's Paste.

Gelatin 4, Water 16, soak 12 hours, then heat to dissolve, and add Zinc Oxide 6, previously rubbed down with Glycerin 12. For use it is melted and applied with a brush to eczematous surfaces. Ichthyol, Resorcin and other medicaments may be added.

Varicose ulcers treated by Zinc Gelatin after thoroughly cleansing the leg or foot with Soap and Spirit, Alcohol, Mercuric Chloride Solution 1 in 2000 to 1 in 4000, or 1 in 40 Carbolic Lotion. The Paste previously melted and cooled is poured over the ulcer, which has previously been disinfected with Hydrogen Peroxide or Mercuric Chloride or Carbolic Lotion. The part is then dried and the paste is bandaged on with a gauze bandage. Another layer of paste is applied ; this is covered with a bandage, and so on until four layers have been applied. May be left in many cases undisturbed for weeks, but it is safer to dress again after two or three days with Salicylic Talc if any discharge. It forms a new skin pliable and slightly elastic.

Pasta Zinci cum Amylo, St. M.'s H.

Zinc Oxide, Starch, Soft Paraffin, Lanolin, of each equal parts. For intertrigo and disordered perspiration.

***Pellanthum** (T.M. 261943), containing 20% Zinc Oxide, is a special preparation and is cooling and soothing for irritable surfaces.

Compounds are Ichthyol, 3%, 5%, 10% ; Ichthyol, 10%, with Resorcin 5% ; Salicylic Acid 1% and 2% ; Liquor Carbonis Detergens 10% and 15% ; Huile de Cade 5% ; Phenol 2% with Menthol 2%.

Lassar's Paste for Eczema. Zinc Oxide 24, Starch 24, Salicylic Acid 2, Soft Paraffin 50.=**Pasta Zinci Composita, U.C.H.**

Useful in chronic and acute eczema when weeping. In irritating conditions the acid may be omitted. It may be retained and increased in amount where there is less inflammatory reaction and where much scaling has occurred.

Pasta Carbonis et Zinci.

Soak Gelatin 16 in a portion of the total Glycerin required (20), and a portion of the water (50 in all required), for 12 hours. Make a paste of Boric Acid 6, Zinc Oxide 6, and Charcoal 18 with remainder of liquids, mix on water bath, and pour into suitable vessel to set.

For leg ulcers the Charcoal is a useful addition. Boric Lotion fomentation should first be carried out to clean the ulcer. If tending to be sluggish Red Lotion helps.

℗**Pilula Zinci cum Belladonna, T.H.**

Zinc Oxide 2 grains, Extract of Belladonna $\frac{1}{8}$ grain. *Dose.*—1 or 2.

Zinc Oxide, Starch, Boric Acid, and powdered **Orris Root,** and mixtures of these, are employed for the toilet.

Calamina Præparata B.P. 1885.

Syn. Lapis Calaminaris Præparatus.

Impure zinc oxide prepared by calcining native Calamine (zinc carbonate) and reducing it to an impalpable powder. Genuine Calamine is useful as a dusting powder, and for making lotions, and may be mixed with Carmine Triturate to produce the desired tint.

Linimentum Calaminæ, G.H.

Calamine 20 grains, Zinc Oxide 15 grains, Soft Soap 15 grains, Olive Oil 4 drachms, Water to 1 ounce.

Linimentum Calaminæ Compositum. U.C.H. is Levigated Calamine 40 grains, Zinc Oxide 22 grains, Zinc Oleo-Stearate 13 grains, Wool Fat 13 grains, Soft Paraffin 1½ drachms, Liquid Paraffin to 1 ounce.

Lotio Calaminæ U.C.H., E.L.

Levigated Calamine 40 grains, Zinc Oxide 22 grains, Glycerin 14½ minims, Water (or Rose Water) to 1 ounce. Elutriate the calamine and zinc oxide by triturating them in a mortar with successive portions of the water and decanting from the siliceous matter, and add the glycerin. Used in eczema, especially where the surface is red and tender, also to conceal acne spots on the face. Ⓟ One grain of mercuric chloride may be added to 6 ounces as antiseptic.

Ⓟ**Lotio Calaminæ E.G.A.** (**Lotio pro Acne, N.H.W.**) is similar, but with 20 grains each of Calamine and Zinc Oxide and 20 minims of Glycerin to the ounce of Water.

For chilblains on the hands this lotion and the following made double or treble strength allay the intense irritation.

In cutaneous affections, *e.g.*, of rheumatic origin a lotion of this kind is useful.—J. Galloway, Pr., Jan. '12,76.

Lotio Calaminæ Oleosa, St. M.'s H., E.L.

Calamine 40 grains, Zinc Oxide 20 grains, Lime Water 3 drachms, Olive Oil 1 ounce (E.L. *to* 1 ounce).

In chronic eczema, *e.g.*, to a freely weeping surface with redness and itching apply with brush or cotton wool swab or spread on thin washed butter muslin. Very important that the inflamed surface should not be treated with a hot thick dressing. Perchloride 1 in 2,000 to 1 in 3,000 may be desirable addition.

Unguentum Plumbi cum Calamina 'Erysipelas Dressing,' **St. G. H.** Lead Plaster 5, Calamine 1, Lard 4, Olive Oil 2.

Zinc Oxy-Phosphate is employed as a dental filling. It is supplied in the form of dried powdered zinc oxide in various colours with the 'liquid,' which consists of phosphoric acid. These are mixed intimately prior to use as a flooring when not too near the pulp.

Zinc Oxy-Sulphate. Consists of calcined zinc sulphate and zinc oxide; mucilage of acacia is used to mass.

10 *grains (as much as lies on a sixpence) mixed quickly with at least 5 drops of the Fluid makes a good mass which sets as hard as stone.*

Fletcher's Artificial Dentine is similar.

Zinc Oxy-Chloride. The 'powder' is of zinc oxide and the 'liquid' zinc chloride solution. Mix thoroughly. Sometimes used as a root-filling and for sensitive dentine; will irritate a live pulp.

Zinci Salicylas. $Zn(C_6H_4.OH.COO)_2+3H_2O=393{\cdot}568$.

Dose.—1 to 5 grains (**0·06 to 0·3 Gm.**).

White crystals soluble in water 1 in 24, and in alcohol 1 in 2·5. As dusting powder and may be combined with gelatin (*v.* Gelatinum Zinci). Internally is used as a substitute for the Valerianate.

Zinci Sulphas (*Off*). $ZnSO_4.7H_2O = 287{\cdot}542$. *Dose.*—1 to 3 gr. (**0·06 to 0·2 Gm.**) tonic; 10 to 30 gr. (**0·6 to 2 Gm.**) emetic.

Fr. Cx. Max. single and daily dose 15 grains.

Soluble 1 in 0·65 water at 59·5° F.—P.J. i./02,552.

Uses.—For gleet and gonorrhœa ½ to 1% injections are given, frequently combined with alum or sometimes Ferrous Sulphate.

Collyrium Adstringens Luteum. P. Austr. (1906).

Ammonium Chloride 2, Zinc Sulphate 5, Distilled Water 890, dissolve and add Camphor 2, dissolved in diluted Spirit (Sp. Gr. 0·895) 100, then add Saffron 1. Digest 24 hours and filter. As an astringent lotion is used for conjunctivitis.

A Collyrium containing ½ grain of Zinc Sulphate and 10 grains Boric Acid per ounce preferable to organic Silver Compounds.—L. ii./11,1570.

Meningococcus infections (carriers) cleared up by means of 1·2% solution in the 'Falmouth Steam Atomizer.'—B.M.J. ii./16,673.

Chlorosis can be rapidly cured by emetic of 20 grain doses for 6 to 8 days, in the morning fasting, of zinc sulphate. Iron sulphate (common) originally given by an old dame.—B.M.J. ii./08,1145.

Lotio Rubra U.C.H. Zinc Sulphate 2 grains, Compound Tincture of Lavender 12 minims, Water to 1 ounce. L.H. has Fuchsin $\frac{1}{500}$ grain instead of the Tincture.

'**Solubes**' **Zinci Sulphatis** are equivalent to 2 and 10 ounces respectively of the above lotion.

'**Solubes**' **Zinci Sulphatis et Aluminis** contain 10 grains of each, for dissolving in a pint, more or less as required, of warm water.

'**Collapsubes**' **of Zinc Sulphate** 1 grain in 1 ounce of gelatin basis are for gleet and gonorrhœa.

Lotio Zinci Sulphatis. R.O.H. is Zinc Sulphate 0·25 or 0·5% in Distilled Water. Guttæ Zinci Sulphatis, 0·125, 0·25 or 0·5%.

Lotio Sulphatum.

Zinc Sulphate 30 to 40 grains, Alum 30 to 40 grains, Ferrous Sulphate 20 grains, Copper Sulphate 2 grains, Water 8 ounces.

Ophthalmic Discs of $\frac{1}{250}$ grain **Zinc Sulphate** and ℙ ℙ1 $\frac{1}{250}$ grain each **Zinc Sulphate and Opium** also ℙ1 **Zinc Sulphate** $\frac{1}{250}$ grain with **Atropine** $\frac{1}{5000}$ grain are made.

Points of Zinc Sulphate are moulded for intra-uterine use. **Points** of equal parts **Zinc Sulphate** and **Alum**, and of **Copper Sulphate** are also made.

Injectio Zinci Sulphatis L.H. for vaginal use.

Has 60 grains in 1 pint of water, *i.e.* 0·69% or 1 in 144·9.

Zinci Stearas, U.S.

A white powder, yielding 15·5% of Zinc Oxide. Contains a small proportion of palmitate. Manufactured by precipitating a Curd Soap solution with Zinc Sulphate.

SUPPLEMENTARY LIST OF DRUGS.

Abrus Precatorius (*Leguminosæ*) Jequirity Seeds, Prayer Beads, Jumble-Beads, Indian Licorice, of scarlet colour, contain abrin, a poisonous principle. Instillation of 5% infusion of crushed Seeds for relief of pannus.—Lieut.-Col. H. Kirkpatrick, L. i./21,1304 ; see also Trachoma, Therap. Index.

Artificially produced ophthalmia by means of jequirity, croton or castor oil seeds in Mesopotamian Expeditionary Force. Eye inflammation caused accidentally with Emetine. Recovery in 10 days with fomentations and use of Atropine.—G. McPherson, per T.D.B. 18/21,85.

Jequiritol (Guttæ R.O.H.) is a glycerinated solution to produce artificial inflammation in eye affections.

Absinthium. *Syn.* Wormwood. Dried leaves and tops of Artemisia Absinthium L., *N.O. Compositæ*. The active ingredient is the oil (1%). Its use is tonic and digestive. Infusion 1 in 20. *Dose.*—1 to 2 ounces. The oil is contained in the drink Absinthe. Other essential oils, *e.g.*, anise, coriander, fennel, peppermint, hyssop, angelica and melissa are stated to be additional constituents.

Acaciæ Cortex (*Off.*). *A. arabica* and *A. decurrens*. Dried bark kept for one year. **Decoctum** (*Off.*). *Dose.*—½ to 2 oz. 6% in water. Astringent, suitable as gargle or lotion = Oak bark.—Ec. Prod. I. i. 21; Pg. I. i. 550, 556.

Acidum Chromicum. *Syn.* **Chromic Anhydride.**—(*Off.*). $CrO_3 = 100{\cdot}0$.

Manufacture.—To obtain pure crystals, mix 300 Potassium Bichromate with Water 500 and add Sulphuric Acid (Conc.) 420 (by vol.). Allow mixture to stand 12 hours. Acid Potassium Sulphate crystallises out which remove. Heat the mother liquor to 80 to 90° C. and add Sulphuric Acid 150 (by vol.), also Water, *q.s.*, to dissolve the chromic anhydride crystals which at first throw out. After standing 12 hours decant the liquid from the crystals that have separated and concentrate to obtain further yield. Drain on a porous plate and wash with Nitric Acid, Sp. Gr. 1·46, and dry in a current of warm air.—U.S.D. In deliquescent, crimson crystals. A powerful oxidising agent. ***Caution : Incompatible*** with alcohol, glycerin, and other oxidisable substances. ***Soluble*** about 5 in 3 of water.

Liquor (*Off.*).—25% *w/v* in water. Aqueous solution 1 in 4, or stronger —is applied to warts on genitals, to condylomata and lupus ; and 1 in 40 to ulcerated gums and mouth sores. For sweating feet 5 to 10% Lotion ; in leucorrhœa and ozœna 1 in 2,000. In secondary syphilis of the pharynx the so-called snail-track ulcer treated with a solution (10 grains to the ounce).—B.M.J. ii./09,197. For mucous and warty patches 5% is useful.

Ulcerative stomatitis. The organisms concerned are obligatory anaerobes. The necrotic tissue once formed presents an almost impervious barrier to the action of lotions containing peroxide and other antiseptics. Simple lavage of the mouth is insufficient and swabbing of the affected area is always required. Chromic Acid relieves pain and removes the necrotic tisssue best. Used warm 1 in 200 to 1 in 400 and applied with wool round a probe. Immediately after the use of the chromic lotion paint the affected area with a mixture of 20 grains of Chloretone to the ounce of equal parts glycerin and spirit. Cocaine 10 grains and Salol 30 grains to the ounce may be used if Chloretone is not available. Potassium chlorate 10 to 15 grains with Ferric Chloride and Magnesium Sulphate should be given internally. *B. fusiformis* Vaccine successful in the acute stages.—Sir K. Goadby, L. i./16,959.

Rodent ulcer treated by Chromic Acid solution, 10% strength, applied with a brush daily with alternately Boric Acid and Zinc ointment. At first the ulcer may actually increase in size. It is less drastic than Arsenic and does not affect healthy tissue cells.—A. Dingwall Kennedy, B.M.J. ii./22,844.

Acidum Gallicum. $C_6H_2(OH)_3COOH + H_2O = 188.099$.

Dose.—5 to 15 grains. Crystals or crystalline powder of brownish colour. Soluble in water about 1 in 100, in glycerin 1 in 12, in alcohol 90% 1 in 5. Properties and uses similar to Tannic Acid, *q.v.*

Acidum Hydrofluoricum HF = 20·008 *Syn.* **Fluoric Acid** of commerce redistilled for medicinal use. Manufactured by the action of Sulphuric Acid on Fluor Spar (CaF_2) in lead or platinum vessels. It contains about 30% of the gas, emits suffocating fumes, and requires to be kept in gutta-percha or leaden bottles.

Bad burns may be produced in a delayed manner. Swelling of thumb and finger consequent on handling a cracked gutta-percha bottle of the acid. The skin became distended to bursting point with intense pain. Blisters were punctured. 1% Phenol compresses and later Normal Saline. Sodium Bicarbonate bath or preferably Ammonium Carbonate suggested as best treatment.—F. C. C. Robb, P.J. i./20,560.

Acidum Hydrofluoricum Dilutum, B.P.C. *Dose.*—5 to 15 minims.

Contains 0·2%. Even thus diluted should not be kept in glass bottles for use. Has been given for goitre.

Ammonii Fluoridum $NH_4F = 37·04$. *Dose.*—4 grains may be considered more than a maximum.—W.H.M. (an experiment on himself for Sir Wm. Gowers). This salt (soluble 5 in 6 of water) has been suggested to diminish enlarged spleen and in goitre in doses of 5 to 20 minims of solution, 4 grains in an ounce, after meals (supply in a gutta-percha bottle). For phthisis inhalation from a 1 in 500 solution has been recommended.

Incompatible with Nitric Acid, Quinine Salts, Spirit of Nitrous Ether and soluble Calcium Salts, but compatible with Tinctura Ferri Perchloridi. **Calcii Fluoridum.** $CaF_2 = 78·07$. *Dose.*—$\frac{1}{10}$ to $\frac{1}{2}$ grain suitably diluted. White powder insoluble in water, has been advocated for improvement of the teeth and building up bone. **Ferri Fluoridum. Ferric with Ferrous Fluoride.** *Dose.*—$\frac{1}{10}$ to $\frac{1}{2}$ grain. A purplish grey insoluble powder, possessing hæmatinic properties has been used for enlarged spleen. **Quininæ Fluoridum.** $C_{20}H_{24}N_2O_2$, $HF = 344·316$. *Dose.*—$\frac{1}{10}$ to $\frac{1}{2}$ grain. In relieving enlarged spleen and in rickets. **Sodii Fluoridum.** $NaF = 42·00$. *Dose.*—$\frac{1}{10}$ to $\frac{1}{2}$ grain. Antiseptic in phthisis. Active against *Staphylo* and *Streptococci* and *B. pyocyaneus* and fairly so against *B. aerogenes capsulatus*. *cf.* "Specificity in Antiseptics," *Vol. II.* **Fluorcform.** $CHF_3 = 70·013$. A 1% solution under the designation **Aqua Fluoroformi** has been made by the writer for pertussis, phthisis, and as a muscular tonic. Odourless, tasteless, and non-poisonous, and does not impair digestion. *Dose.*—For young children 1 teaspoonful every hour, for older children $\frac{1}{2}$ ounce. Two patents taken out for making this.—P.J. ii./08,258.

Acidum Malicum *Syn.* **Hydroxysuccinic Acid.** $C_2H_3(OH)(COOH)_2 = 134·048$. *Dose.*—1 to 5 grains. White deliquescent crystals soluble in water 1 in 1, and in Alcohol 1 in $1\frac{1}{2}$. Has been used as throat spray in diphtheria, and other throat affections. Possesses properties similar to Tartaric Acid in a modified form. It is chemically allied to Succinic Acid. In phthisis much larger doses—up to 2 drachms have been given.

As an antiseptic, found to be specific against the gas bacillus (*B. aerogenes capsulatus*), *vide Vol. II.*

Acidum Meconicum. $C_7H_4O_7,3H_2O = 254·115$. White crystals slightly soluble in water. Forms soluble salts with Opium Alkaloids. It occurs in good opium to extent of 5 to 8%. Has little or no physiological action. Apparently only contains 2 Carboxyl groups though triatomic. Salts are of variable composition.—P.J. ii./05,548.

For method of assay of the Acid in the drug *vide* P. Van der Wielen.—P.J. ii./13,114. *cf.* also Vol. ii.

As Meconic Acid readily forms a tri-sodium compound it was for long regarded as a tribasic acid. It contains, however, only two COOH groups and an additional OH enables it to form tri-compounds with stronger bases. With alkaloids it only forms dibasic or monobasic salts. Although Meconic Acid in boiling water evolves CO_2 and becomes slowly converted into Comenic Acid, it may be dried on the water bath to constant weight losing only its water of hydration.—D. B. Dott, P.J. i./21,232.

Acidum Osmicum. $OsO_4 = 254·9$.

Syn. Osmium Tetroxide, Hyperosmic Acid. *Dose.*—$\frac{1}{64}$ to $\frac{1}{10}$ grain.

In waxlike yellow crystals. Its vapour is intolerably pungent. Soluble slowly about 1 in 50 of water. It is poisonous and a powerful oxidizing body. It is used in microscopy; fat and medullary matter are blackened by it.

This and **Potassium Osmate** 1% solution in 2 to 10 minim doses have been injected hypodermically (painful) for neuralgia, for strumous glands, goitrous swellings, sarcoma, and cancer; also sciatica and muscular rheumatism, and given internally in epilepsy.

Liquor Acidi Chromo-Aceto-Osmici (Flemming's Strong Solution). Mix Glacial Acetic Acid 100 with Osmic Acid 8 in water 400, and Chromic Acid 15

in water 1,500. Cancerous growths have been treated : 8 Cc. injections at edge of tumour, or 1 Cc. just beneath its surface. Also for fixing, in histology.

Acocanthera. *Syn.* TOXICOPHLŒA. Hottentot's Poison Bush. Not legally a scheduled Poison, but a potent drug, producing strong contraction of the heart. There are several species. *A. Venenata* is employed in South Africa, here referred to. Probably all contain Ouabain or allied glucoside, but that of A. *Venenata* thought to be distinct. Originally the plants were employed as arrow poisons.

Extractum Liquidum (1=1) from the leaves. A. D. Waller, F. R.S. showed physiologically for us that the leaves are more powerful than the stem and that the *dose* of the Liquid Extract of the leaf may be taken as about 2½ to 7½ minims (0·15 to 0·45 Cc.), *i.e.*, ½ a dose of Tincture of Digitalis, B.P. '98. This is only tentative and more exact comparison, *e.g.*, with aconitine is desirable. *cf.* also Proc.Phys. Soc., Dec. 19/08, Jl. Phys., vol. xxxviii. For use as a substitute for digitalis in heart disease.

℗ **Aconitum Laciniatum** is the probable source of Nepaul Aconite. Root called *Bish* or *Bikh* in India. Contains pseudaconitine. It is in bolder roots than the official and these are horny in fracture. Internally relieves neuralgia and acute gout, and externally a valuable liniment for chilblains. ℗ Tincture 1 in 8 of 90% alcohol. *Dose*, 1 minim hourly.

Adeps Præparatus *Off.*—*Syn.* ADEPS SUILLUS, AXUNGIA, **Ph. Ned Adeps Lotus P. Dan.**

The purified fat of the hog, *Sus scrofa* (Linn.)—from the 'flare' or 'omentum' contains 60% triolein (sold when separated by freezing and pressure as 'Lard Oil'), *v.* Sapones, *Vol. II.* The remainder is palmitin and stearin. *Soluble* in ether 1 in 22, hardly soluble in alcohol. **Adeps Induratus** is for use in the tropics. The liquid constituent is removed to a great extent by pressure. **Adeps Benzoatus** (*Off.*) is made with 3% Benzoin. To be avoided as a basis for eye ointments.

Adonis vernalis (P. Austr.)—Contains a hygroscopic glucoside Adonidin which resembles Digitalis in its action, but is said not to be cumulative. *Dose*, in powder, 3 to 6 grains; of infusion 1 in 40, 4 drachms; of Adonidin, ¼ to ½ grain. daily. Stated to have cardiac tonic and diuretic properties. Epilepsy has been treated with it combined with Bromide. **Tincture.**—Leaves and Stalks employed 1 in 10.—*Dose*, 10 to 30 minims. Adonidin is a local anæsthetic, and suitable for use in ophthalmology. In chronic glaucoma, iritis, and irito-cystitis 1% solution has been used, 3 drops relieve pain.

Adonite, a sugar ($C_5H_7(OH)_5$), occurs in the plant. The crystals have sweet taste, are very soluble in water, less in spirit. M. Pt. 102° C. It is employed as a Bacteriological Sugar in fermentation reactions. *cf.* Vol. II., B. Typhosus.

Æsculus Hippocastanum.—Horse-Chestnut. Tincture of Seeds 1 in 10 proof spirit has been given for painful hæmorrhoids. *Dose.*—10 minims night and morning. Also emmenagogue. A liquid extract has been used, painted on or rubbed in, in rheumatism and neuralgia. **Kastancl.**—Extractum Hippocastani Liquidum with 8% camphor; used in rheumatism.—(Austria.) Ph. Notes.

Æsculin, $C_{15}H_{16}O_9.1\frac{1}{2}H_2O = 367{\cdot}227$, a glucoside, soluble in water, to which 2 to 3% Sodium Carbonate is added, also soluble in alcohol. Solutions have a blue fluorescence, and have been used similarly to Quinine in X-ray and Finsen light treatment (*q.v.*). *Dose.*—1 to 5 minims of 5% solution.

Chestnuts contain from 21 to 47% of Starch and Acorns from 55 to 57%, the total sugar in addition being 11 to 19 and 6 to 9% respectively. On hydrolysis with acids about 30 gallons of absolute alcohol could be obtained from a ton of nuts.—L. ii./17,757.

Aqua Zeozoni is the name applied to a 0·3 to 0·5% solution of an oxy derivative of Aesculin neutralised with Boric Acid. Applied to the eye it is said to absorb such ultra-violet rays of light as have a wave-length of between 300 and 400. Suggested to take the place of veils, umbrellas, etc. Specially indicated as prophylactic in blinding snow light, etc.,—no irritation to the eyes even after long continued use for a period of several months.—Amer. Jour. of Oph., Sept., 1911, Oph., 1911,807.

Alcoolature Stabilisée suggested by the late Professor Bourquelot.—*cf.* Valerian. In the case of horse chestnuts, Alcohol of 75% strength is employed for stabilisation and extraction.—C. D. Aug. 5/22, p. 208.

Æthusa Cynapium.—Fool's Parsley, Lesser Hemlock. Contains a small amount of volatile alkaloid, with the properties of Conine; calculated as hydrochloride constitutes 0·0003% of the entire fresh herb. A larger proportion under favourable conditions, may be produced leading to poisonous properties. It also contains a volatile oil, 0·015% of the entire fresh plant and resin 0·8%. Has narcotic properties. Garden Parsley, *vide* Apiol.

Æthyl Bromidum. P.G.V. Fr. Cx., P. Jap., P. Helv. $C_2H_5Br = 108·97$
Syn. Hydrobromic Ether.

A colourless, very volatile liquid with a strong peculiar odour and a sweetish warm taste, becoming brown by exposure owing to decomposition, bromine being split off. It has Sp. Gr. 1·4735 and boils at 38·8° C. P.G. dilutes with spirit to improve keeping properties. *Soluble* 1 in 85 of water and miscible with alcohol 90% and ether.

It was advocated as a safe and convenient anæsthetic for short (minor nose and throat) operations. *Dose.*—1½ to 3½ drachms, by inhalation, but it is dangerous, the anæsthesia being very brief, disappearing almost as soon as inhalation is closed.

For *local* anæsthesia it may be used as spray, or simply short covered contact for neuralgia. It may be added to Menthol Liniment. **Somnoform** (*q.v.*) contains 5%. **Ethyl Bromide Sterules.** Encased in cotton wool and silk, contain 5 minims in each; are convenient for use when crushed. Useful in asthma and epileptic convulsions.

Ethylene Bromide.—$C_2H_4Br_2 = 187·882$. *This is poisonous—distinguish from the above. Dose.*—1 to 2 minims in alcoholic solution or oily solution hypodermically or in **Gelatin Capsules.** A colourless liquid, of Sp. Gr. 2·163, soluble 1 in 4 of 90% alcohol, insoluble in water. Reduces frequency and intensity of attacks in epilepsy.

Agar-Agar—Japanese Isinglass. P. Jap. IV. Membrane-like strips, consisting of the dried jelly of *Gelidium corneum*, a sea-weed. Another variety comes from Borneo. Agar U.S. is described as the dried mucilaginous substance extracted from Gracilaria Lichenoides, but it is not that species which yields Agar-Agar used in medicine. It would be more correct to define as from several species of Gelidium (Class Rhodophyceæ).—E. M. Holmes, P.J. ii./16,484. P. Jap. IV. states *G. Amansii* and other species. 1 in boiling water 200, forms on cooling, a transparent jelly, suitable for invalids. It has little nutritive value—it is not digested—but is useful for treating constipation, especially of the type where the stools are hard and dry owing to complete absorption of liquid from the digestive tract. For this purpose it is best crushed into small pieces like bran—termed **Flaked Agar.** Clinical experience shows that finely powdered or even sand-like powder is not efficacious. Teaspoonful doses occasionally of the dry substance in flake form sprinkled in little moist food, *e.g.*, stewed apples, act as mild aperient in that it softens the fæces, but should be employed at first in moderation, as it may possibly cause obstruction. By taking up moisture it increases the volume of the fæces and promotes peristalsis.—*See* Cascara Jelly, also. It is used in preparation of culture media for bacteria (*q.v.*); also for finishing calicos, silks, &c.

Method of inducing young children to take Agar. Cut up into flakes about the size of bran and cook with cereal food. Most will take it in this way, others will take it in broth or soup if thoroughly cooked before mixing in. Several hours hard boiling are required before it becomes homogeneous enough to mix well, otherwise it will be detected by the child. Children of 4—5 years need as a rule about 1 drachm.—P.J. ii./10,491.

Vanilla, Almond and **Raspberry** flavored **Flaked Agar** are prepared.

Linseed appears to act, as regards weight yield of fæces, better than Agar Agar.—88% increase against 48%, but not so well as Psyllium, 97%. Did not depend on humidity.—B.M.J.E. i./14,59.

✱**Thaolaxine** (T.M. 319983), described as Agar Agar with Rhamnaceous Extracts, in form of Scales, Cachets, Tablets and Granules. A laxative in treatment of chronic constipation.—L. ii./12,1445.

✱**Jubol** (T.M. 313263). Tablets of Agar-Agar with biliary and intestinal glands extract. *Dose.*—3 tablets at bedtime.—Gehe.

Agaricus Albus.—*Syn.* Polyporus Officinalis, Boletus Laricis, Fungus Laricis (P. Austr.), **Polypore de Melese** (Fr. Cx.). Purging Agaric. *Dose.*—10 to 30 grains. Light, spongy pieces. Large doses purgative, small ones astringent for night sweats, diarrhœa and to diminish bronchial secretion. Tincture 1

in 10 of 60% alcohol. *Dose.*—20 to 60 minims. EXTRACT—*Dose.*—½ to 2 grains. Prepared by exhaustion with 60% Alcohol, yield is about 6%.

Not to be confused with the fly agaric, Amanita Muscaria, which contains

℗ **Muscarine.** Various substances have been identified with the name Muscarine, at least three, with the formula $C_5H_{15}NO_3 = 137{\cdot}153$. The original Muscarine was found in Amanita Muscaria and had the composition $(CH_3)_3N.OH.\ CH_2CH\ (OH)_2$.

It has been stated to have an action on the heart, being a muscular poison, and to be antagonistic to Atropine. See also 15th Edn., p. 795. At present it is not obtainable commercially.

Synthetic Muscarine or Choline Nitrous Ether is weaker than the natural. Muscarine Chloride is stated to be seven times as active as Arecoline and five times as active as Acetylcholine. A content of 0·4 Gm. of Muscarine Chloride is assigned to 25½ kilos of fresh amanita.—H. King, Jl. C.S.T. '21, p. 1743.

Acidum Agaricum. Agaricin P.G.V., Ital. Helv. and Jap, and Dan. $CH_2C(OH)(CH)(C_{16}H_{33})(COOH)_3 1\frac{1}{2}H_2O = 443{\cdot}451$. *Syn*, Laricic Acid.

Dose.—⅛ to ½ grain is given to restrain the sweating of phthisis. Max. Single dose (P.G. and Ital.) 1½ grains. **Bismuth** and **Lithium Agaricinates** are described.—F.N., 1906,15.

Agrimonia Eupatoria (*Rosaceæ*).—Common agrimony. Mild astringent.

Elixir Agrimoniæ Compositum (Lunan). A special preparation of agrimony, rhubarb, toad-flax (*Antirrhinum Linaria*), barberry, caraway, chamomile dandelion, parsley, is in demand in incipient appendicitis; stated to avert an operation, and in any condition of the stomach and alimentary canal likely to produce inflammatory symptoms. *Dose.*—1 drachm in water thrice daily; as hepatic stimulant: mild astringent. **Mistura Agrimoniæ Compcsita.** *Dose.*—½ ounce thrice daily, is of similar composition for gallstones, and to prevent their formation—stated to prove effectual. CAPSULES are also made.

Agropyrum, Triticum (*Off.*) or COUCH GRASS. Dried rhizome of *A. repens* (*Triticum repens*). Contains triticin, a carbohydrate similar to inulin. Useful in gonorrhœa. Diuretic and aperient.—Pg. I. iii. 50. Decoctum (*Off.*).

Dose.—½ to 2 oz. Prepared with Water, 1 in 20. Ext. Liq. (*Off.*)

Dose.—1 to 2 dr. Made 1 = 1 with boiling water, and 25% of alc. 90%.

Flavouring.—Syl Lavandulæ; Aqua Anethi.

Triticum Repens (genuine) is a commercial rarity. The chief, if not the only substitute is the rhizome of *Cynodon Dactylon*, the dog grass. Spain is apparently the geographical source of the material of commerce.—J. Small, B.P. Conf., 1919.

Alchemilla Arvensis (*Rosaceæ*). Parsley Piert. Small annual plants with green flowers. Is superior to buchu in some instances. Infusion of leaves 1 in 10. *Dose.*—1 to 2 ounces.

Aletris Farinosa, B.P.C.—Star Grass (Colic Root). From the rhizome of this are prepared a fluid Extract with diluted alcohol, U.S. (1890, 1 = 1) *dose*, 5 to 15 minims, and a Cordial or Elixir (B.P.C. containing Liquid Extract of Aletris 25, Liquid Extract of Liquorice 6, Simple Elixir 45, Water to 100). *Dose.*—½ to 1 drachm, are used as uterine tonics. **Extractum Aletridis Liquidum, B.P.C.** 1 = 1 by percolation with Alcohol 45%.

✱ **Alginoid** (T.M. 279707) **Iron.** *Syn.* ✱ALGIRON (T.M. 283697).—*Dose*, 2 to 15 grains. Alginic Acid from seaweed is combined with iron, forming an insoluble brown powder containing about 11% of iron. Does not constipate: is given for anæmia. Pills and pellets are prepared. Also compound pills. Algiron 2 gr. with Extract Cascara ⅛ gr.; with ℗ Cascara Extract ¼ and Nux Vomica Extract ⅛ gr.; ℗1 Arsenic $\frac{1}{100}$ grain; ℗1 with Arsenic $\frac{1}{100}$ grain and Strychnine $\frac{1}{100}$ grain; ℗1 with Quinine 1 grain and Strychnine $\frac{1}{100}$ grain; and ℗ with Nux Vomica Extract ⅛ grain and Zinc Valerianate 1 grain. **Cupri Alginas.** *Dose.*—$\frac{1}{24}$ to ⅙ grain. A green powder. Used in lupus, leprosy, cancer and anæmia.—B.M.J. i./06,1464.

Allium Sativum.—Garlic bulb. (*Liliaceæ*). *Dose.*—½ to 2 drachms. Useful in cases of dilated bronchi with fetid expectoration: expectoration and fetor lessened. **Succus.**—*Dose.*—10 to 30 minims. Extract = inspissated juice. *Dose.*—4 to 10 grains. Pill contains 4 grains extract. In pulmonary phthisis it often diminishes cough and expectoration ceases, lessens night sweats, improves appetite, weight is gained and sleep becomes regular under its continued use. In bronchiectasis.—B.M.J. i./06,83. The juice to allay nervous vomiting.—H.

Oleum Allii Essentiale.—This Oil is excreted through the lungs and skin—not apparently by the kidney. It has no solvent action on Uric Acid. Its principal constituent is usually taken to be Allyl Sulphide $(C_3H_5)_2S$ = 114·15. The leek contains no other active principle.—B.M.J. ii./11, 609—but statements to the contrary are given in some text books. Stimulant, expectorant and stomachic. In chronic bronchitis, pneumonia, nervous affections, also in cholera, tuberculosis, hysteria, &c. Allyl Sulphide can be made by interaction of Alcoholic Potassium Sulphide with Allyl Iodide, *Dose* of either the Natural Oil or Allyl Sulphide, ½ to 2 minims, in **Capsules**, ½ minim of Allyl Sulphide per kilo body weight may be taken as lethal dose. —B.M.J. ii./11,609.

Laryngeal tuberculosis treated by ½ to 1 drachm, two or three times a day, of the Garlic Juice with Tinct. Lavand. Co. and Syrup. Simplex, also gargle or spray (or combined), or for internal use, accompanied by poultice (or blister) of pulped garlic externally latter also to tuberculous ulcers. Fresh juice is not so severe in action as the pulped garlic—yet not so rapid in effect. The juice should never be applied to broken surfaces. Lengthy application of poultices (3 to 4 weeks with changes) may be required, but effect should first be tried for a few hours, as some are more susceptible than others. It is held by W. C. Minchin (B.M.J. ii./12,460) who advocates the treatment, that Allyl Sulphide is specific in all tuberculous lesions in accessible situations, or in those which can be rendered accessible. Thus every case of tuberculous disease in the leg, foot, arm, hand, testicle, etc., gets well under Allyl Sulphide treatment. Allyl Sulphide stated to have high germicidal power.

The following were finally adopted as modes of treatment:—

Emplastrum Allii.—Fresh garlic *q.s.*, pulped, 2 lbs., to this add ½ lb. lard warmed to a cream, and mix thoroughly. Spread on thin butter-muslin and apply to the part, changing the dressing about every 24 hours.

Unguentum Allyl Sulphidi, *Martindale.* 0·1%—increased in strength if desired—in Adeps Anseri Benzoatus, could replace above as being more expeditious to prepare.

Inhalation.—Fresh Garlic Juice 56, Alcohol (90%) 7, Eucalyptus Oil (*var.* Citriodora) (Bayard) 1. 4 ounces is sufficient for three weeks treatment of pulmonary tuberculosis. The juice is *fresh* and *not filtered.* Patient to use inhaler at least 1 hour night and morning. **Capsules of Allyl Sulphide,** 2 minims, can be used in addition if practicable.

For lupus apply the fresh juice at night and allow to dry, wash off in morning and apply a bland ointment.

Where a strong antipathy to the taste of Garlic exists, its use in any form has failed to give relief.—W. C. Minchin, "Treatment, Prevention and Cure of Tuberculosis and Lupus with Allyl Sulphide."

The Inhalant is stated to be ideal for use in a respirator (Minchin's). In a case described the quality of sputum improved in a week, cough became useful and less wearisome. A large tuberculous cold abscess in the scapular region improved under the inhalant, but the internal pressure of the abscess contents resulted in a sinus forming through a needle hole (previous aspiration) and a chronic discharge followed. The effect of Allyl Sulphide was magical. —B.M.J. ii./12,880.

With regard to the ***Antiseptic Power*** of Allyl Sulphide, we have determined the ***Carbolic Coefficient,*** *vide* Vol. II. The substance is a little more potent than Phenol.

Suppuration of wounds controlled by Succus Allii diluted with 3 or 4 parts Distilled Water. Notable improvement in 48 hours. A case of empyema remarkably cleaned out with this lotion. Stronger than this (1 with 2 of water) caused pain. Later 1 with 9 of water used when suppuration definitely controlled.—V. Gabriel, L. ii./15 603.

W. C. Minchin adds he has used Allium preparations in treatment of suppurating wounds and foul ulcers for 15 years with satisfaction. Used 1 diluted with 3 it will not blister. Used "conc." it does. Internally it is the best intestinal antiseptic. It is a veritable sheet anchor in many fevers.—L. ii./15, 888.

Whooping Cough treated by Garlic either eaten chopped up or under the soles of the feet between two pairs of socks, but the juice *per os* is more convenient.—T. Mark Hovell, B.M.J. ii./16,15; i./17,284.

Duodenal ulcers have been successfully treated by rectal injection of the juice diluted with three times quantity of water.

Hydrarthrosis has been cured by placing the fleshy scales of the onion round the joint and keeping in place with a bandage.

Gangrene of the lung treated by 20% Garlic Tincture.—Pr. June 22/443.

Allium Cepa, the ordinary onion, is of less strength than Allium Sativum.—P.J. i./20,345.

Allium Porrium.—The common leek also contains Allyl Sulphide.

Alnus Glutinosa.—The common Alder. *Uses.*—Astringent and tonic. Contains about 20% of Tannin. *Liquid Extract* 1=1 of the bark. *Dose.*—10 to 30 minims. Made by percolation with 45% Alcohol. Set aside the first portion, percolating (¾ of the whole), and continue percolation with remainder of the Alcohol, concentrate and add to reserve portion. Was recently advocated in cancer. A Liquid Extract of the leaves, prepared by boiling with water and adding Alcohol *q.s.* to preserve, has also been used. In 140 cases of cancer, pain, cachexia, and exhaustion diminished.

Alstonia constricta, *Off.*—Bark used in Australia as a febrifuge. *Dose,* in powder, 5 grains. A crystalline alkaloid, Alstonine or Chlorogenine, $C_{21}H_{20}N_2O_4,3\frac{1}{2}H_2O=427{\cdot}337$ has been isolated from it. Tincture, *Off.*, 1 in 8 Alcohol 60%. *Dose.*—½ to 1 drachm. Should be less, 5 to 20 minims. Influenza has been treated by Tincture in 10 minim doses. Three other alkaloids exist in it. A mild diaphoretic. When prescribing the tincture that of *A. constricta* should be specified.

Alstonia scholaris. *Off.*—Dita bark, from India and the Philippines, contains amongst others an alkaloid, Ditaine, *syn.* Echitamine, $C_{22}H_{28}N_2O_4$ and the milky juice of the tree forms a substance resembling gutta-percha. Tincture, *Off.*, 1 in 8 Alcohol 60% *Dose.*—¼ to 1 drachm.—P.J. i./01,362. *Off.*—These two drugs are under one monograph.

Infusion,—*Off.*—1 in 20 boiling water.

Tonic in malaria, in chronic diarrhœa and advanced stages of dysentery.

Althæa. Marshmallow, dried root of *Althœa officinalis, Linne* (*Malvaceæ*) from second year's growth and deprived of the periderm. Contains Asparagin, *q.v.* Is mucilaginous and used in pill making to give 'body.'

Amadou.—Oak agaric, Surgeons' agaric, Touchwood. *Polyporus fomentarius* L. A fungus prepared with alkali and nitre, in light brown elastic pieces employed as a mechanical hæmostatic. It is included in P. Austr. under the name *Fungus igniarius.*

Ambergris. A substance found floating on the surface of the sea—in southern hemisphere, valued for its perfume which is generated on keeping in a closed receptacle for a year or so, generally believed to be an intestinal product from the sperm whale.

A sample, 'possibly genuine,' had M. pt. 75° C. with a small amount of substance which did not melt at 100° C. It was of grey colour with little odour. It was soluble to extent of 93·8% in Petroleum Ether which extract had Ref. Index (70°) 1·495, Iodine No. 107·1, Acid value 1, Sap. No. 4·4; this portion presumably containing the Ambrein was soluble in absolute Alcohol on warming and melted to a clear sticky amber liquid at 42° C.—all of which figures are scarcely those of the adulterant ozokerite.—Evans' Anal. Notes, 1911.

Amylene. *Syn.* Iso-Amylene. C_5H_{10} = 70·105. ***Manufacture.***—Wash Fusel Oil (B.pt. about 130° C.) with equal volume of salt solution by shaking—this removes Ethyl, Methyl, etc., alcohols. Draw off the upper layer, dry with Calcium Chloride and distil, collect distillate which comes over at 130° C. Mix with twice its weight of fused Zinc Chloride and allow to stand at ordinary temperature three days. (The process is simply one of dehydration, $C_5H_{12}O = C_5H_{10} + H_2O$). Distil on water bath—it boils at 40° C. Collect the fraction coming over at 40 to 60° C. into ice and redistil.

Amyleni Hydras. *Syn.* DIMETHYL-ETHYL CARBINOL, TERTIARY AMYL ALCOHOL $(CH_3)_2 : C(OH)C_2H_5$ = 88·121. *Dose.*—30 to 80 minims, flavoured with liquorice. P.G. has maximum single dose 4·0 Gm. Maximum in 24 hours 8·0 Gm.

Manufacture.—Shake in a closed vessel equal volumes of Amylene, Sulphuric Acid, and water in a freezing mixture for 30 to 40 minutes. Separate any undissolved Amylene. Dilute the acid liquor with two vols. of ice cold water and filter through a filter moistened with water. Neutralise with Sodium Hydrate and distil. Tertiary Amyl Alcohol comes over with a little water. Dehydrate with fused Caustic Potash. Rectify and collect the fraction 99—103° C.

A colourless liquid, of pungent taste and odour, resembling a mixture of paraldehyde and camphor. Soluble in 8 parts of water, also in alcohol. Sp. Gr. 0·815 to 0·820, B. pt. 216° F. Hypnotic, occupying a position between chloral and paraldehyde.

Capsules contain 10 minims in each. *Dose.*—3 to 6.

Owes hypnotic power possibly to alkyl groups. Dimethyl carbinol is twice as weak as this Dimethyl-ethyl Carbinol and tri-ethyl carbinol is still more powerful. 3 drachms, suspended with Tragacanth Mucilage ½ ounce, flavoured with Licorice and made up to 2 ounces for the dose, have been given as a night draught.—B.C.D. i./14,70.

Six women died in Bethlem Hospital through getting pure amylene hydrate in place of a draught. The dispensing was done by a medical man.—C.D. Nov. 21/14.

Amylene-hydrate Carbamate. $NH_2.CO.OC(CH_3)_2.C_2H_5$ = 131·142. *Syn.* **Aponal.**

Dose.—15 to 20 grains (30 max.) mild hypnotic. Stated to induce easy and calm sleep in 20 to 30 minutes, also to be free from ill effects on gastro-intestinal tract or other organs. Suggested for use in insomnia due to nervous debility and other causes, and to replace powerful hypnotics.—L. ii./11,1412.

Said to be made by action of Urea Hydrochloride on Amylene Hydrate (Dimethyl-ethyl-carbinol).—P.J. ii./11,442. B.M.J. i./12,733.

Amylene-Chloral, $CCl_3.CHOH.OC_5H_{11}$ = 223·489.—*Syn.* ✱DORMIOL (T.M. 228811) a 50% solution; DIMETHYL-ETHYLCARBINOL-CHLORAL. *Dose.*—5 to 50 minims (**0·3 to 3 Cc.**).

May be prepared by mixing 100 parts of Anhydrous Chloral with 60 parts of Amylene Hydrate. It is an oily liquid slowly forming a clear solution with an equal quantity of water. Soluble at once in large quantities of Water, miscible with Alcohol, Ether and Fixed Oils. Sp. Gr. 1·24, boiling point 93° with decomposition. Absence of Free Chloral is shown by the non-reduction of Ammoniated Silver Nitrate Solution.—P.J. ii./10,392.

Capsules contain 8 minims (0·5 Gm.). Hypnotic which may be used alternating with others.

Amylum—Starch is obtained from the common wheat (*Triticum Sativum*). maize (*Zea Mays*), rice (*Oryza Sativa*), and potato (*Solanum Tuberosum, N. O. Solanaceæ*).

Tapioca Starch. *Syn.* Manihot, Manioca or Mandioca Starch, from Brazil may form a commercial competitor of the varieties in use.

Anacardium occidentale.—Cashew Nut. The pericarp of this contains a vesicating oily liquid, which consists of 10% of Cardol (to which the vesicating properties are due), and 90% of Anacardic Acid, $C_{22}H_{32}O_3$ = 344·366. The oil has been used in leprosy, ringworm, ulcers, corns, and internally as a vermifuge. Tincture, 1 in 10 Alcohol 90%. *Dose.*—2 to 10 minims. **Anacardii Folia** are in **Ph. Ned.** The marking nut, from *A. Officinarum*, possesses similar properties.

Ananassa Sativa (Pine Apple) contains a free acid,—the distribution of this acid is unequal, it is said to be present in a large amount near the cuticle and almost entirely absent in the tissue at the centre. It also contains Bromeline, a ferment which is not stable. It has been used among the natives in South Africa for diphtheria and diphtheritic sore throat.

Tinctura Ananassæ (Sativæ). *Dose.*—(As digestive) 25 to 30 minims with meals, is prepared by macerating Ananassa Sativa 1 for three weeks in Alcohol (90%) 1¼, adding Glycerin 2 and making up to 4 with Alcohol 90% After tonsillotomy, painted or sprayed on, prevents the formation of even the most minute suspicion of membranous looking exudation, and the stump heals in four to six days. Also useful in chronic tonsillar abscess. Bacteriological examination showed it to have good effect on Strepto- and Staphylo- infection of the throat. May also prove of value as digestive.—Craik Taylor.

Pineapple Juice is said to be a reliable vegetable ferment for dissolving necrosed tissue in quinsy, tonsillitis, boils, etc.

Butyric Ether $C_3H_7CO.OC_2H_5$. *Syn.* **Ethyl Butyrate,** has odour of pineapple. Sp. Gr. 0·9 nearly. B.Pt. 120° C. Diluted 1 in 20 or 1 in 10 in spirit is used as pineapple essence. Is made from duty-free Spirit, and it behoves the purchaser to procure, fill in and have endorsed a licence from the Board of Customs and Excise, stating that it will be used as a flavouring agent.

Anchusa Officinalis (*Boraginaceæ*) **Alkanet,** causes the heart to stop in

diastole, it yields 5 to 6% red amorphous resin "Alkannin," and contains two red substances of acid nature, has some relationship to action of Curare —*q.v. v.* L. i./06,974.

Anethi Oleum—Distilled from fruit of *Peucedanum graveolens*. It is a yellow oil with odour resembling caraway. Sp. Gr. 0·900 to 0·920 approx. Soluble 1 in 3 of 90% alcohol. Some normal distillates of dill-fruit have a lower Sp. Gr. than 0·905, but, since the oil is for medicinal purposes, and the carminative principle is carvone, a high proportion of the latter should be ensured by the minimum Sp. Gr limit indicated. A high Sp. Gr. should put the analyst or user on his guard for admixture with caraway oil.—Umney

Anhalonium Lewinii.—Mescal Buttons, the tufts of young leaves of the plant are eaten by the Mexican Indians to produce intoxication accompanied by visions. Effects due to alkaloids, P1 Anhalonine, $C_{12}H_{15}NO_3 = 221{\cdot}188$, and P1 Mescaline, $C_{11}H_{17}NO_3(?) = 211{\cdot}199$. P1 Mescaline is the principle to which the peculiar visual hallucinations are due.—Pr. lxi. 1. Effects of Mescal.—P.J. ii./99,357

A liquid extract of commerce diluted, on an empty stomach, had no effect in 50 minims. *Dose.*—100 minims, however, in 15 minutes produced slight dyspnœa and transient headache, then intermittent tetanoid spasms in hands and feet, with sensation of general *bien aise*. A sense of egotistical concentration with delightful feeling of irresponsibility to one's surroundings succeeded, and lasted, in all, eleven hours. No spectral illusions, however, nor vertigo, nor subsequent drowsiness. Heart accelerated.—Bernard Smith, B.M.J. ii./13,21

Anisi Fructus (*Off.*). Anise. Dried ripe fruit of *Pimpinella Anisum*, Linn. (*Umbelliferæ*). Contains **Oleum Anisi** (*Off.*) which is also distilled from the Star Anise (*Illicium verum*, N.O. *Magnoliaceæ*), the latter being that used almost entirely in this country. *Dose.*—½ to 3 minims. Aromatic and carminative. Colourless or yellowish oil congealing between 10 and 15° C. Sp. Gr. at 20° C., 0·975 to 0·990. **Aqua Anisi** (*Off.*).—Anise Fruit 1 pound, Water 2 gallons. Distil ½. **Spiritus Anisi** (*Off.*).—1 in 10 in Alcohol 90%. *Dose.*—5 to 20 minims.

Anise Oil.—A sample was adulterated with 40% Petroleum Oil.—E. J. Parry, C.D., 1912,81,372; Y.B.P., 1913,68.

Eau de Botot—Anise Oil 20, Peppermint Oil 13, Saffron Tincture 5, Alcohol 70% to 1,600. Some formulæ contain Cinchona, Rhatany, Cloves, &c.

Anethol (P. Belg., P. Austr., Ph. Ned., P. Jap. III.). $C_{10}H_{12}O = 148{\cdot}146$. The stearoptene from the Anise Oils melts at 20° C., B.pt. 230° C. Soluble in Alcohol 90% 1 in 3 approximately. *Dose.*—½ to 2 minims.

In infantile colic 1 to 2 minims of Anise oil followed by a teaspoonful of castor oil, is all that is needed.—Whitla Pract. Med.

Anthemis nobilis.—*Syn.* 'English' or 'Roman.' Chamomile Flowers (*Compositæ*). The largest, most 'double,' and whitest flowers are preferred. Tonic, aromatic, stomachic, emetic in large doses. In addition to the Extract, B.P. '98, *dose* 3 to 8 grains, Infusion, and Oil, a Tincture, 2 of single fresh flowers in Alcohol (90%) 3, and Water 1, are made. The latter is used for summer diarrhœa of children. *Dose.*—3 to 10 minims.

Oleum Anthemidis.—Distilled from the flowers of the Roman chamomile. Sp. Gr. 0·905 to 0·915, (*Off.*). Soluble in less than its own vol. of 90% alcohol.

'German' Chamomile Flowers are those of *Matricaria Chamomilla*. They have a hollow conical receptacle and no bracts, whilst *A. Nobilis* flowers have solid receptacles and are densely covered with concave, blunt, narrow scaly bracts.

Anthemis cotula. 'May-weed,' common in the fields, caused a bullous eruption.—J. H. Sequeira, L. ii./21,560.

Anthoxanthum odoratum.—Sweet Vernal Grass. Flowers develop odour of coumarin on drying. Tincture, 1 of fresh-flowering herb in 10 of 40 O.P. spirit (making allowance for the moisture the plant contains). *Dose.*—2 to 6 minims internally and diluted as a nasal lotion for hay fever.

Apis Mellifica.—The Honey Bee. A Tincture—*Dose* 1 minim hourly, is prepared, which is said to have effect in relieving urticaria.—Leonard & Christy's Dict. Mat. Med. See also Acid Formic.

Arachis Hypogœa. (*Syn.* Pea Nut, Gound Nut, Goober Nut, Manilla grain, Chinese Almond).—The seeds of the plant form the 'pea nuts' of commerce. Have dry, brittle envelope and yellowish-white kernel. Very rich in a non-drying oil (40 to 50%) which is *Off.* with Sp. Gr. 0·916 to 0·921. Ground down employed as cake for cattle. Very nutritive.—See also P.J. ii./11,434. Eating the kernels causes a desire to drink.—L. i./17,670.

Arbutin, $C_{12}H_{16}O_7 + \frac{1}{2}H_2O = 281{\cdot}196$.—A crystallised glucoside obtained from the leaves of *Arctostaphylos Uva-ursi* (*Ericaceæ*) U.S. (Fluid-extractum 1=1 Glycero-hydro-alcoholic), Bearberry, and other ericaceous plants. Soluble 1 in 8 in cold water. It is given for chronic cystitis and vesical catarrh, in dose of 5 to 15 grains with sugar; is not poisonous. Liquid-extract of Uva Ursi leaves, *dose*, 20 to 40 minims, is preferable, the Infusion (*Off.*) has 1 ounce to 1 pint of boiling water. Antiseptic; also as vermifuge for dogs 60 to 100 grains. Arbutin, given *per os* is partly decomposed with formation of Hydrokinone but most of it is absorbed by the kidneys.—Dixon.

For preparation of True Arbutin see last Edn., p. 781.

Busserole FR. CX. = Uva Ursi Folia.

Infusum Uvæ Ursi Concentratum, B.P.C. by *b.* process *p.* 496. *Dose.*—½ to 1 drachm.

✱**Cellotropine** (T.M. 304700), Arbutin - Benzoic - Ether, $C_6H_4.OC_6H_{11}O_5.OCOC_6H_5 = 376{\cdot}255$ ½ to 1 Gm. (= 1 'teaspoonful') thrice daily, or even up to 5 Gm. in phthisis.—F.N., 1909,54.

Areca, Semen Arecæ, P.G. iv. Betel Nut. B.P. Add 1874.—From *Areca Catechu* (*Palmaceæ*). *Dose.*—1 to 4 drachms. Is astringent, and is used as a vermifuge, especially for dogs; is also used as a masticatory and added to dentifrices. Contains several alkaloids, the most active being ℙ **Arecoline** (about 0·1%). $C_8H_{13}NO_2 = 155{\cdot}152$, a liquid which forms a crystalline soluble ℙ **Hydrobromide** P.G.V., FR. CX., P. Helv., P. Hung., $C_8H_{13}NO_2,HBr = 236{\cdot}08$. FR. CX. gives maximum single dose 0·0005 Gm. $\frac{1}{120}$ grain approx., and maximum daily dose 0·0015 Gm. ($\frac{1}{40}$ grain), approx. Its physiological action is allied to that of pelletierine and pilocarpine. It is sialogogue and diaphoretic. Resembles physostigmine as a myotic, 1% solution suitable. Serviceable in glaucoma.

Areca Nut Alkaloids.—These are related. Arecaidine, Arecoline (Arecaidine Methyl Ester), Guvacine, Arecaine (*N*-methylguvacine) and Guvacoline, (Guvacine Methyl Ester). Arecaine can be produced by the action of Formaldehyde and Formic Acid on Guvacine. Arecoline has been made by esterifying Arecaidine with Methyl Alcohol. Guvacoline has been converted into Guvacine and vice versa by esterification or hydrolysis.—Hess & Leibbrandt, Ber. 1918, Abst. Ann. Rep. Chem. Soc., 1919 (Vol. XV.), p. 107; see also J.C.S.A., Feb., 1919, p. 93.

Betel Nut Chewing. The ingredients are betel leaf, areca nut, black catechu, lime, turmeric, paste and tobacco leaf. Details as to betel nut (oral) carcinoma. In Siam betel nut chewing, women chew more than men. The habit prevents decay of teeth, but leads to chronic changes of mucous membrane of the mouth, causing loosening and loss of teeth.—A. G. Ellis, B.M.J. ii./21,808; Jl. Trop. Med., June 1/22,149.

Tenaline, a liquid specialty, used in veterinary practice; is an efficient vermifuge. *Dose*, 1 minim for each pound of the weight of the dog.

Arnicæ Flores *Off.*—*A. montana.* Dried flower heads. Acrid stimulant equivalent in effects to Arnica rhizome.

Tinctura, *Off.*—*Dose.*—½ to 1 drachm. 1 in 10 Alcohol 70%

Arnica dermatitis.—Arnica often used by the public for bruises and injuries but may produce dangerous rashes. Under saline purges and sedative ointment rash and irritation subsided.—B.M.J. ii./12,1707.

Arum Maculatum.—The berries of the plant known as "Lords and Ladies" act as an irritant poison causing excoriation of the mouth and sometimes bleeding and convulsions, and the tongue sometimes swells so as to fill the mouth and prevent swallowing. The swelling is best reduced by bleeding. For further details of the plant see a description by E. M. Holmes.—P.J. i./15,324.

Succus Ari prepared from the leaves. *Dose.*—1 drachm. Has been used in neuralgia.

Asafetida.—Gum resin obtained by incision from the root of *Ferula Fœtida* and probably other species. Coat pills first with mucilage and afterwards with Pill Varnish to cover the odour—not with silver, which would blacken. Nervine stimulant expectorant and carminative. **Emulsum Asafœtidæ,** U.S. Asafœtida 40, Water to 1,000. **Enema Asafetidæ,** L. H. Tincture of Asafetida, ½ ounce. Starch Enema to 4 ounces. TINCTURE (*Off.* and '98). 1 in 5 Alcohol 70%. *Dose.*—½ to 1 drachm. U.S. 1 in 5. *Average dose.*—15 minims. ***Flavoring.***—Syl Menthæ Piperitæ, Syl Limonis, Syl Coriandri; Syrupus Zingiberis not much good. **Liquor Antihystericus.**—*Dose.*—½ to

1 drachm. On the Continent a mixture is used of Camphorated Spirit of Ether and Asafetida Tincture equal parts.

Threatened appendicitis. Flatulent distension often remarkably improved by moderate dose of castor oil combined if necessary with enemata of Turpentine and Asafœtida. Change in iliac swelling often effected.—B.M.J.i./09,1285.

Chemical details on Asafetida last Edn., p. 782.

Asclepias incarnata.—White Indian Hemp rhizome. Is a speedy, potent and reliable diuretic.—Pr. xxiii. 141. Tincture, 1 in 10. *Dose*, 5 to 40 minims.

Asclepias tuberosa.—Pleurisy Root. Is expectorant and diuretic. Tincture, 1 in 10. *Dose.*—5 to 40 minims.

Asparagin. *Syn.* ALTHEIN. Amido-Succinic Acid Amide $C_2H_3(NH_2)(COOH)$. $(CONH_2)$, H_2O = 150·116. *Dose.*—1 to 2 grains. White crystals, having a slight acid reaction. May be obtained from *Asparagus officinalis*, and the roots of liquorice, belladonna, &c. Soluble 1 in 50 of water, also in acid and alkaline solutions. Insoluble in absolute alcohol and ether. An aqueous solution dissolves freshly precipitated mercuric oxide, and is recommended for hypodermic injection in syphillis. Has decided diuretic effect. For cardiac dropsy and chronic gout one grain is given three times a day.

Avena Sativa.—Tincture of the oat, 1 in 5 made with 60% alcohol, in 20 minim doses recommended to relieve pruritic condition induced by eruption in dermatitis.—Fox, Photog. Atlas of Diseases of Skin, vol. ii., p. 66.

Azadirachta Indica. The bark was *Off.* in I.C. Add. generally called *Melia Azadirachta. Syn.* **Nim or Neem, Margosa,** is common throughout India—mostly planted. In malaria its efficacy is very doubtful.—I.D.C. 1916.

Margosic Acid.—From Oil of Margosa Seeds. The Sodium and Potassium Salts being soluble can be given *per os.* The Calcium and Zinc Salts for local use in skin affections.—Chatterjee & Ray, Ind. Jl. Med. Res. 1918, 5,656 abst., Y.B.P. 1919, 182.

Badiane. FR. CX. 1884 and 1908 is Star Anise Fruit *q.v.*

Teinture de Badiane. FR. CX. 1884. 1 in 5 by weight, Alcohol 80%.

Balsamum Gurjunæ.—Gurjun Balsam, Wood Oil. *Dose*, ½ to 2 drachms. A greenish fluorescent balsam from the trunk of the growing tree *Dipterocarpus turbinatus* and other species of this genus; imported from the East Indies. Has aromatic odour and taste, and has been used as an adulterant of copaiba. It is not completely soluble in either ether or alcohol. Used with success for gonorrhœa, and as a liniment for leprosy; also in emulsion with lime-water, which is given freely internally. As an expectorant, given with malt extract. To test for *vide* Copaiba.

Balsamum Peruvianum. (*Off.*) *Dose*, 5 to 15 minims. From trunk of *Myroxylon Pereiræ*, U.S. *Toluifera Pereira* (*Leguminosæ*). A viscid liquid insoluble in water, soluble in chloroform, absolute alcohol and glacial acetic acid; slightly in ether and petroleum benzine. Contains Cinnamein and Cinnamic Acid. Sp. Gr. between 1·14 and 1·158. "Synthetic" Balsam may be detected by shaking 2 Gm. with 10 Cc. of Petroleum Spirit. Evaporate the Petroleum Solution on a water bath, dry on same 10 minutes, cool, and add three drops Nitric Acid 1·38. Mix. Peru balsam gives a golden yellow colour. Inhalation of a few drops of vapour 1 in alcohol 2 in a little hot water useful in pharyngitis. As a dressing in war; may be left on wounds, if aseptic, for 20 days if necessary. Scabies has been satisfactorily treated with a paint of Balsam 3, Glycerin 1. But test for albumin in urine both before and during treatment. **Balsamum Lanolinatum.**—Lanolin 5,000, Vaselin 2,000, Balsam Peru 12, Otto 4.—Ph. Notes (Denmark). C.X. has **Unguentum Balsami Peruviani.**—Peruvian Balsam 1, Lard 7. Wyatt Wingrave's formula: Balsam of Peru 20, Trikresol 5, Vaselin *q.s.* to 100. Mix warm. Ⓟ Lotio Balsami Peruviana.—MacNaughton Jones uses as application to the hair (excellent in alopecia) a preparation of Peru Balsam 1 drachm, Spirit of Rosemary 1 ounce, Tincture of Cantharides 4 drachms, Pilocarpine Nitrate 2 grains, Almond Oil 1 ounce. This is applied at night, and washed off next morning with a borax and spirit lotion.

Peru, Tolu Balsam and Storax compared.—Allen, 1910, Vol. III., p. 454.

Good results in accidental wounds and in compound fractures were obtained by the application of Balsam of Peru—the wound may do well even when the skin is very septic. It gives rise to hyperæmia in wounds. The Balsam is simply poured in. It may be that wounds should not be dressed too often.—L. ii./11,442; B.M.J.E. i./12,30.

For scabies an ointment containing Peruvian Balsam and Sublimed Sulphur 4½% of each, in Soft Paraffin.—W. Knowsley Sibley (Treatment of Skin Diseases.)

Menciere's Solution, *q.v.* contains Peruvian Balsam.

Perugen.—A preparation containing 60% of Cinnamein. Employed as an application to wounds and in skin affections.—L. ii./13,1069.

Balsamum Tolutanum (*Off.*). *Dose.*—5 to 15 grains. Obtained from the trunk of the *Myroxylon Toluifera* (*N.O. Leguminosæ*). Recently prepared is soft, but becomes brittle in cold weather. Soluble 1 in 1 alcohol 90%. A standard of total aromatic acids, is now adopted. **Syrupus Tolutanus.** (*Off.*). *Dose*, ½ to 1 drachm. This is now made by digesting the balsam and water on the water bath ½ hour. U.S. is Tincture of Tolu (1 in 5 of Alcohol 94·9% vol.) 5 parts, Sugar 82, Magnesium Carbonate 1, Water to 100 *s.a.* **Tinctura** (*Off.* and '98) 1 in 10 alcohol 90%. *Dose*, ½ to 1 drachm. The balsam has the properties of the Cinnamic and Benzoic Acids it contains.

Baptisia. *Dose*, 1 to 5 grains. An extractive from Baptisia tinctoria, in small doses a laxative, in large doses a cathartic. Tincture 1 in 10 of Alcohol 60%. *Dose.*—5 to 30 minims.

The Mother Tincture of Baptisia (Homœopathic) has a reputation for treatment of boils.

Baptisol a phenol in *B. Tinctoria* responsible for the blackening of the leaves on bruising or treating with chemical agents.—P.J. ii./15,761.

Barii Chloridum. — Barium Chloratum, P.G. $BaCl_2 2H_2O = 244{\cdot}322$. *Dose.*—½ to 1½ grains. Max. single 3 grains or 9 grains per diem. Colourless crystalline plates, with bitter saline taste. *Soluble* 1 in 2½ of water. Solution is destructive to bacteria. *Incompatible* with sulphates, phosphates, tartrates and carbonates.

Mostly used for analytical purposes, but is of value as a heart tonic; has alterative properties; has been tried for syphilis and scrofula. Also 1% solution as eye wash in scrofulous inflammation. Varicose veins are treated by internal use, and applied locally over the distended vessels.—H. In the form of **Barium Water** (*vide* Mineral Waters) it has also been much used for glandular swellings. *Antidote.*—Sodium Sulphate.

Barii Nitras. $Ba(NO_3)_2 = 261{\cdot}386$ and **Barium Acetate** $(CH_3COO)_2Ba = 255{\cdot}433$ are employed in place of the chloride for testing.

Bassia Latifolia. MOWRA FLOWERS in India. Contain a very large proportion of fermentable sugar—in one case over 63% of the weight of the air-dried flowers. A potable spirit can be prepared from—the Oil being removed by patented process. A perfectly pure spirit was prepared by digesting the strong distillate with solid Potash and redistilling,—possibly the basis of the process.—P.J.ii./10,120,141.

The seeds yield *Mowrah Butter* melting at 24° to 25° C., this fat is also suitable for candle and soap making (*cf. B. Longifolia*) also as a food, but it soon becomes rancid in the hot climate.

Bassia Longifolia. N.O. *Sapotaceæ.* The seeds of this tree growing in Southern India and the Malay States are called Mowrah Seeds. *Syn.* Illipi, Illipei or Illupi Nuts; they yield 43 to 52% of a whitish-yellow or greenish-yellow solid fat M. pt. 42° C. and solidifying at 36° C. This fat contains about 80% of stearin and is therefore specially suitable for candle making. The residue after expressing the oil was found to contain a Glucoside 'Mowrin.' This yields 'Mowric Acid.' The parent substance has laking effects on blood corpuscles when suspended in saline solution. Both Mowrin and the acid have a digitalis-like action on the heart when injected.—B.M.J. ii./09, 541; P.J.ii./09,364, but they have an injurious effect on the heart and hæmolyse blood corpuscles.—B.M.J. i./12,61.

Beberinæ Sulphas. *Syn.*—Buxine and Pelosine. Probably a mixture of Sulphates of Beberine, $C_{36}H_{42}N_2O_6$, and Nectandrine, $C_{40}H_{46}N_2O_8$. *Dose*, 1 to 10 grains; if in a mixture a little Aromatic Sulphuric Acid covers its bitterness. It is in scales, and is prepared from the bark of *Nectandra Rodiæi*, Bebeeru bark. It is also contained in Pareira Root.—Report of Examination—Arch. Pharm. *250*, 684. It is freely soluble in water. **Beberine Hydrochloride** is in reddish brown scales. Use, antipyretic and tonic as Quinine; useful for menorrhagia.

Belæ Fructus (BAEL FRUIT), *Off.*—*Ægle marmelos* (*Rutaceæ*). Fresh half ripe fruit. Mild astringent.—P.J. 46; E.P.I. i./120. Fresh fruit useful in dysentery.—L. i./02,66. In dyspepsia.—Ghosh.

Extractum Liquidum, *Off.*—*Dose.*—1 to 2 drachms.

Syrup Ægle Marmelos Co: *Dose.*—Half to 1 ounce with water thrice daily. Is a proprietary in India, containing Bael Root, Cyperus Rotundus, Ginger and Plectranthus Zeylanicus. Stomachic in diarrhœa and dyspepsia.

Berberinæ Carbonas $C_{20}H_{17}NO_4\ H_2CO_3 + 2H_2O$ (Schmidt) = 433·297 or $+5H_2O$. *Dose.*—2 to 5 grains.

Although contained in Hydrastis and Calumba, is obtained principally from the bark of *Berberis vulgaris* and other species of Barberry. In bitter yellowish crystals, insoluble in water. Its salts, the **Hydrochloride, Phosphate,** and **Sulphate,** are bright yellow in colour, and soluble in water, the hydrochloride about 1 in 400, the phosphate 1 in 12, and the sulphate 1 in 150. *Dose* of each.—2 to 6 grains. Given for indigestion, diarrhœa, malaria, and sickness in pregnancy. Berberis Berries (Baies) are official in Fr. Cx. as ingredient in Electuaire diascordium.

Elixir Berberinæ. *Dose.*—1 to 4 drachms. Contains Berberine Hydrochloride 1 grain per drachm.

Berberis *Off.*—*B. aristata* (*Berberidaceæ*). Dried stem. Tonic. Extract is known as 'Rasot' in India. In intermittent fever.—Ghosh.

Liquor Conc., I.C. Add., 1900.—*Dose,* ½ to 1 drachm. Alcohol 20%, 1 in 2.

Tinctura, *Off. Dose.*—½ to 1 drachm. Alcohol 60%, percolate 1 in 10.

Betel, *Off.*—*Piper betle.* (*Piperaceæ*). Dried leaves. The fresh leaves are contained in Pan (Beng.).—Ghosh. Stimulant, narcotic, masticatory.—Ec. Prod. I. vi. pt. i., 254; Pg. I. iii., 183. Externally in sore throats.

Blepharis Capensis.—This South African plant is recommended as a remedy for anthrax. Tincture, 1 in 8 of 90% Alcohol. *Dose.*—15 minims (1 Cc.) every three hours; gradually lessened, as the drug is an active one.—P.J. i./98,140. Recommended in snake bites and insect bites, also for toothache.—P.J.ii./00.63.

Vomiting sickness of Jamaica caused by poison produced by the immature fruit of **Blighia Sapida.**—B.M.J ii./17,109.

Boldoa fragrans (*Peumus Boldus*). *Dose.*—1 to 3 grains in cachet or capsule. The leaves, from Chili and Bolivia, resemble those of Sweet Gale (*Myrica Gale*), but are more aromatic. In dyspepsia, liver affections, rheumatism, and as a diuretic for atony of the bladder. *Boldine,* an alkaloid, has hypnotic and slight local anæsthetic properties. *Boldoglucin* is a glucoside with similar action. *Dose.*—3 grains. **Tinctura Boldoæ,** 1 in 5 of 90% alcohol. *Dose.*—10 to 20 minims. A useful drug for hepatic diseases, especially painful ones. The inhabitants in South America take half a litre of strong decoction in the day.—B.M.J.E. ii./07,72.

Bonduc Nut.—The Seeds of *Cæsalpinia bonducella* are used in India as a tonic and febrifuge—generally mixed with black pepper for the purpose.

Brucea Sumatrana.—A plant indigenous to China and S. Asia. The seed known as El Kossam is said to be useful in dysentery, diarrhœa, and menorrhagia.—*Cf.* B.M.J. i./13,1403.

℗ **Brucine,** $C_{23}H_{26}N_2O_4 + 4H_2O$ = 466·403. *Dose.*—$\frac{1}{12}$ to ½ grain. An alkaloid from *Strychnos Nux Vomica* seeds—small white acicular crystals, with bitter taste. Very soluble in Alcohol and Chloroform. Its salts are soluble in water. Like Morphine it gives a red colour with nitric acid (*see* Water Analysis), which Strychnine should not. It is said to possess only $\frac{1}{12}$ of the physiological power of Strychnine. For epilepsy the ℗ Hydrochloride, $C_{23}H_{26}N_2O_4.HCl$ = 430·807, has been given as liquor, same strength as Liquor Strychninæ, in 10 minim doses increased until ½ a grain is reached.

℗ **Brucine Sulphate** $(C_{23}H_{26}N_2O_4)_2.H_2SO_4$ = 686·754 + Aq. White crystals soluble 1 in 80 in water. For Dixon's results of comparison with strychnine, *vide* Strychnine.

Bryonia. *Syn.*—Vitis alba; White Bryony.

B. dioica is the only species commonly found in this country—hence called English Bryony. Contains an amorphous glucosidic bitter substance and an amorphous alkaloidal principle—intensely bitter. Chemical Notes and refs. last Edn., p. 785.

Tinctura Bryoniæ. B.P.C.—From bruised fresh roots of *Bryonia alba* or *B. dioica* (*Cucurbitaceæ*) a tincture is prepared corresponding in strength to 1 of dried root to 10 of alcohol (60%). *Dose.*—1 to 10 minims (0·06 to 0·6 Cc.) or more. Useful in pleurisy. Relieves the pain and allays the cough. In large doses it is an active cathartic, used for dropsy. It also checks metrorrhagia. The fresh plant applied to the skin will cause vesication.

Buteæ Semina. *Off.*—B. *frondosa.* (*Leguminosæ*). Dried kernels freed from testæ. Contains Moodooga Oil. Anthelmintic like Santonin.—P.I. 79, 446; E.P.I. i. 550; Pg. I. i. 454. Pulvis, *Off.*—*Dose.*—10 to 20 grains.

Cajuputi Oleum.—Distilled from leaves of *Melaleuca Leucadendron* and other species. Sp. Gr. 0·919 to 0·930. Further chemical notes: last Edn., p. 785.

Gastric flatulence is at once relieved by Spirit of Cajuput 8 minims, Sal Volatile 25 minims, Spirit of Chloroform 15 minims, Spirit of Peppermint 12 minims—taken in a wineglass of water.—A. P. Luff, B.M.J. i./14,635.

Calendula Officinalis. (*Compositæ*). U.S. Dried florets. *Dose.*—15 grains Tincture U.S. 1 in 5 Alcohol 96%. *Dose.*—5 to 20 minims. Applied to wounds, and is given in amenorrhœa. It has diuretic and stimulant properties

Calumba. (*Off.*) Dried root, sliced, of *Jateorhiza Calumba* (*Menispermaceæ*). Non-astringent tonic for simple debility and indigestion. Can be given with Salts of Iron. Infusion 1 in 20 (cold water); Tincture 1 in 10 Alcohol 60% (U.S. 1 in 5). *Flavoring.*—Glyl Aurantii Amari (double dose), Glyl Lavandulæ, Syrupus Aurantii Amaræ. Was represented in I.C. Add. by *Coscinium fenestratum* (false Calumba Root). Calumba is sometimes termed 'Radix Fraseri.'

Cambogia, U.S., P. Austr. *Dose.*—½ to 2 grains. FR. CX. Gomme Gutte. Yellow Gum Resin from *Garcinia Hanburii* (*Guttiferæ*) growing in Siam A powerful purgative. May cause severe griping. Will expel tapeworm. Is rarely now given alone.

Canella Alba. Wild Cinnamon (*Magnoliaceæ*) contains Aromatic Oil. Stomachic.

Cannabis Sativa (*Urticaceæ*), Russian hemp-seed, oil-free (extracted by Benzine) has been used in form of decoction, strength 100 Gm. in 1 litre, heated gently and evaporated (without boiling) to 250 Cc. 35 to 50 Cc. of the resulting liquor are given to children in the food. The dried hemp seed freed from oil contains 1·5% Phosphorus in organic combination as against 1% before the fat is removed. Children are said to greatly improve under the treatment.—B.M.J E ii./07,27.

Emulsio Seminum Cannabis.—10% in water. Used as a potion against gonorrhœa, two glasses daily Has slight sedative properties.—(Russia) Ph. Notes.

Carbo Animalis. ANIMAL CHARCOAL. B.P., 1885, U.S., as also **Carbo Animalis Purificatus**—by means of hydrochloric acid. **Carbo Ligni, U.S. Wood Charcoal.** *Dose.*—60 to 120 grains. Made by burning wood, *e.g.*, willow, to red heat with access of as little air as possible. In cachets or as charcoal biscuits as an absorbent in distension of the stomach, *e.g.*, in dyspepsia. Is antiseptic, and is used externally as a poultice to foul ulcers. COCOA NUT CHARCOAL has been employed by Dewar owing to its remarkable powers of absorbing gases to improve high vacua.

Charcoal as an absorbent might be useful in cholera, typhoid, gastro-enteritis.—P.J ii./12,98. As antidote. *See* Poisons and Antidotes.

Liquor Unoline. *Dose.*—½ ounce. A preparation made from willow charcoal containing potassium and other nitrates. In rheumatism, neuritis and arterio-sclerosis.—L. ii./17,53.

Norit. *Syn.* **Activated Charcoal.** *Dose.*—5 Gm. (75 grains) in water three or four times daily. A special variety of vegetable charcoal with high adsorbing qualities, containing 85% ashless vegetable charcoal and less than 5% mineral matter. *Uses.* Similar to ordinary charcoal in gastric and intestinal affections. Locally useful for suppurating wounds and ulcers.

Norit Tablets, 5 grains each. Useful protective against infection *via* the tonsils and air passages. It adheres to the mucous membrane.

By the use of Norit the strength of such solutions as 1% Mercuric Chloride and 1% Morphine Hydrochloride could be greatly reduced.—L. i./23,342.

Carbonis Bisulphidum. CS_2=76·125. A clear liquid with characteristic odour Sp. Gr. 1·268 to 1·269. Very slightly soluble in water, but readily in Alcohol, Ether and Chloroform and the fixed and volatile oils. Dissolves Phosphorus Sulphur and Rubber with avidity. Is poisonous, but has been employed in treatment of phthisis.

Acute poisoning by, respirations very slow (about 12 per minute). Expiration deep, prolonged and blowing; heart not much affected, but pulse weak. —Amer. Med., May 27/05; M.A., 1906,12

In tuberculosis, inhaled, useful, has no disagreeable after effects. Is parasiticide. In fibrinous pneumonia small doses with water have been used.

Carbonis Tetrachloridum.—CCl_4=153·845. A heavy, volatile, and mobile chloroform-like liqud, has a pleasant pungent, quince-like odour if pure. Sp. Gr. 1·56. B.pt. 77 to 78° C. The vapour inhaled relieves hay fever. Employed locally, sprinkled on piline or lint covered with American oiled cloth, it quickly relieves neuralgic pains. Has been used as, but is not a successful anæsthetic (proportion of deaths stated to be 1 in 20,000.—B.M.J. ii./09,243). Deaths have been caused by its use as a dry shampoo by hairdressers.—Details in Edn. XVI., p. 810.

Ankylostomiasis, *Syn.* Uncinariasis, Dochmiasis, Hookworm infection, is well treated with Carbon Tetrachloride. *Dose.*—The general conclusion of many papers is that 3 Cc. (45 minims) (in several capsules) is adequate, but 6 Cc. doses have been taken by an adult. 10 to 20 m. is safe for children of 3 to 4 years. Children of 1 year can have 10 m. A child of 10 should receive 30 m. A youth of 16, 40 m. (2½ Cc.), and so on even when seriously ill from various causes. It aids expulsion of ascaris lumbricoides if followed by purgative, but is not as effective as Chenopodium Oil in killing this. It is not necessary to precede or follow administration by a purge.—L. Nicholls and G. G. Hampton, B.M.J. ii./22,8. Effective in animals. M. C. Hall swallowed 3 Cc. in hard gelatin capsules without untoward effect. —L. i./22,391,1057. 10 Cc. doses considered a maximum—given to prisoners and tolerated.—P.J. ii./22,295. 10 Cc. doses, in treatment of hookworm disease, produced no ill effects. 12 Cc. removed all hookworms and ascarides —C. N. Leach, per Jl. Trop. Med., Aug. 15/22,264. It also expelled *oxyuris vermicularis* and some *trichuris trichiuria* and *ascaris lumbricoides*. It acts as a moderate purge, so itis not necessary to prepare the patient as for thymol. It may be combined with Oil of Chenopodium for ascaris.—J. G. Reed, B.M.J. i./23,1048. Larger doses than 3 Cc. unnecessary and possibly dangerous. Wide variations in individual reaction to drug, 20 Cc. having been given without ill-effects. Alcoholics especially susceptible, 1·5 Cc. having produced toxic symptoms in an acute alcoholic.—W. G. Smillie and S. B. Pessoa, per Jl. Trop. Med. April 16/23,127. Of little value against Ascaris, Trichiuris or Hymenolepis nana. It is a soporific and is well tolerated by children.—J. Borland McVail, Ind. Med. Gaz. Aug. '22, per Jl. Trop. Med., Oct. 16/22,336. Doubtful whether it is an actual anthelmintic. It has soporific action on hookworm patients.—T. A. Henry, P.J. i./23,28. Hookworm in Filipinos. Approximately 50% of the adults found to be infested with hookworm.—B. Schwartz and M. A. Tubangui, per Jl. Trop. Med., May 1/23,143. Report from Fort Benning Hospital, Ga. Very few symptoms following administration of drug. Vastly superior to Oil of Chenopodium or Thymol. Owing to the success of the experiment—100% cures—the writers contemplate making it the routine treatment.—A. T. Cooper and A. J. Vadala, Jl. Trop. Med., April 16/23,130. One treatment administered to each individual in a given area lowered original hookworm infection of 100% to less than 9%. In Fiji 27,000 people treated without a casualty.—S. M. Lambert, per Jl. Trop. Med., Mar. 15/23,92; Col. Rep., Aug. 15/23,61.

Action of Carbon Tetrachloride on the liver.—Inadvisable to prescribe 5 Cc. doses, as an anthelmintic, with purgation, let alone without it. 3 Cc., however, appears safe. It is specific for ankylostomes, and is fairly efficient for *ascaris lumbricoides* and *oxyuris vermicularis*, but of little value in the elimination of *trichuris trichiura*.—J. F. Docherty and E. Burgess, B.M.J. ii./22, 907.—The Problem of Hookworm. Discipline worth more than treatment of cases. Surface infection of the soil is only one phase in the free life of the hookworm. The hookworm larvæ spend a considerable part of their life in the soil at various levels. Eggs may hatch out in a few days and the larvæ start then to migrate. Investigation proceeding. Work in U.S.A. and in Great Britain.—L. i./23,604.

Carvacrol (*q.v.*) has been tried in hookworm.

For *dry cleaning*, being non-inflammable, the solvent is useful. When added to Benzine for safety it should constitute at least 70% of the mixture. For glove cleaning it leaves the leather less likely to crack.

Iodised Carbon Tetrachloride. Two cases of lupus erythematosus and one of tuberculous lupus treated by local use of Carbon Tetrachloride and the same Iodised (3% is mentioned). Applied on cotton wool alternately, and in addition Iodine internally. Fistulas were washed out with 1 to 5 Cc.

of the preparations. In a case with great œdema 1 to 2 Cc. of the Iodised preparation was injected under the skin.—Goubeau, Cong. Derm. and Syph. Strasbourg, 1923.

Cardamomi Semina. Dried ripe seeds of *Elettaria Cardamomum* (*Scitaminaceæ*). The seeds should be removed from their pericarps when required for use. Given in atonic dyspepsia. Contained in **Pulvis Aromaticus,** U.S. **Tinctura Cardamomi Composita** (*Off.*). *Dose,* ½ to 1 drachm. Cardamom Seeds 1·4% with flavourings. Raisins now omitted and 45% Alcohol *vice* 60%. Tincture, U.S., 3 in 20 Alcohol (48·9% vol.). **Compound Tincture,** U.S., Cardamom 20, Saigon Cinnamon 25, Caraway 12, Cochineal 5, Alcohol (48·9% vol.) to 1,000. Compound Cardamom Tincture is incompatible with Akaloidal salts Bismuth Oxide, Oxycarbonate and Subnitrate : employ Liquor Bismuthi in preference. It is also incompatible with metals of the alkaline earths and with Sodium Bromide.—P.J.i./06,218.

Gelatinous flaky deposit in the Tincture due to Caraway and Cochineal. Suggested use of Sugar instead of Glycerin, slightly stronger Alcohol and the marc not pressed.—J. H. Franklin and J. Greenhalgh, B.P. Conf. 1923. —P.J. ii./23,96.

Carminum.—Red colouring matter, containing about 50% Carminic Acid, $C_{17}H_{18}O_{10}$ = 382·229, prepared from the cochineal insect — *Coccus Cacti* (*Hemiptera*), the dried fecundated female insect reared on *Nopalea Coccinellifera* and other species of *Nopalea*. The sun-dried insects, if killed by sulphur or charcoal fumes, are silvery colour and designated "silver grain," owing to deposit of wax on the surface. If killed by hot water and dried artificially the "black grains" are produced. It is insoluble in water, but entirely soluble in aqueous ammonia. Is used to colour toilet preparations and for staining in microscopy.

Nature and Structure of Cochineal. An exhaustive paper.—Am. Jl. Ph. Aug., 1913.

Carminic Acid is a hydroxyanthrapurpurin.—J.C.S.A. i./20,442.

Carmalum. Carminic Acid 1, Ammonia Alum 10, Distilled Water 200. Heat to dissolve. Cool and filter. Suitable for staining after osmic acid. *cf.* Mayer's Carmalum. **Liquor Carmini.** Carmin 1, Distilled Water *q.s.* to moisten, Strong Solution of Ammonia 1, dissolve, and add Water 10. Used to colour toilet preparations, &c. **Tinctura Cocci** (*Off.* and '98). 1 in 10 Alcohol (45%). *Dose.*—5 to 15 minims.

Liquor Cocci. Liquid Cochineal. Cochineal (not bruised), Potassium Carbonate, of each 1, Distilled Water 8. Heat in water-bath for half an hour, gradually add Acid Potassium Tartrate 1, stir well, continue the heat, and add Potash Alum (in powder) 1; heat five minutes more, strain through absorbent wool and pour over contents of strainer sufficient Distilled Water to make strained product measure 8; when cold add Chloroform ½% by volume. As indicator in titrations the official tincture may be used. Suitable for titrating alkaloids with mineral acids, the alkaloids giving the same colour as mineral alkali.—P.J. ii./08,194. Ipecacuanha Alkaloids give trouble however.—Am. Jl. Ph., Nov., 1911, p. 158.

Carui Oleum. *Syn.* OLEUM CARI, U.S.—Caraway Oil. *Dose.*—½ to 3 minims. Distilled from fruits of Carum Carvi (*Umbelliferæ*) (content up to 7%), and rectified. Colourless or yellowish oil. Sp. Gr. 0·910 to 0·920. Soluble in equal vol. of 90% Alcohol.—*Off.*

Carvonum, P. Austr. *Syn.* Carvol. $C_{10}H_{14}O$ = 150·162.

A yellowish or colourless liquid prepared from the oil has Sp. Gr. 0·960 —0·964. Soluble 1 in 2 diluted alcohol.

See also Allen, 1911, vol. iv., p. 214, for method of determination, &c.

Caryophylli Oleum.—Clove Oil. *Dose.*—½ to 3 minims. Colourless to brownish oil. Distilled from the flower buds of *Eugenia Caryophyllata* (*Myrtaceæ*). Sp. Gr. 1·047 to 0·165. *Off.* Soluble 1 in 3 of 70% Alcohol. We find by experiment samples agree with this. Should contain at least 85% Eugenol (*Off.* and Ph. Ital.). Aromatic carminative. Given with advantage both internally 3 to 5 minims, and injected hypodermically in phthisis 5 minims in olive oil. A most satisfactory disinfectant for the hands (said to be even more efficient than Mercuric chloride), catheters, catgut, &c.—P.J. ii./06,553.

Castor Oil as an adulterant to the extent of 10% has been found in Clove Oil. The Oil was dextrorotatory. Treated with steam the residue was easily detected. Sap. V. 179, soluble in 90% Alcohol, insoluble in Petroleum Ether.

Tinctura Caryophylli 1 in 8 Alcohol 90%. Digest 10 days. *Dose.*—20 to 40 minims or more; valuable aromatic, carminative and stimulant.

In senile flatulence good effects by powdered cloves, better even than a fluid preparation. Spirit of cloves is absorbed in the stomach, but the woody fibre passes on to the seat of the complaint. 5-grain capsules of powdered cloves coated in keratin (keratin coating not satisfactory.—W.H.M.), recommended for trial.—L. ii./10,1306

Cascarilla, (*Off.*). Dried bark of *Croton Eluteria* (*Euphorbiaceæ*). Contains resin and 0·5 to 3% Volatile Oil, also the bitter principle cascarillin (best extracted by Acetone—Naylor, P.J., July 28,06), together with resin and tannin. Aromatic tonic. **Infusum Cascarillæ,** 1 in boiling distilled water, 20. Infuse 15 minutes. **Tincture** (*Off.* and '98), 1 in 5 Alcohol 70%. *Dose.*—½ to 1 drachm.

Cassiæ Pulpa, *Off.* *Dose.*—1 drachm to 2 ounces, from pods of *Cassia Fistula* Linné (*Leguminosæ*), **Cassia Fistula,** U.S. *Av. dose.*—1 drachm. Dried cylindrical brown fruit 20 mm. in diam., and 25 to 50 cm. long. Fr. Casse en batues. Mild aperient.

Castor, P. Austr. and Helv. Dried preputial follicles and secretions from the Beaver, *Castor Fiber* (*Rodentia*), in brown pieces. To contain not more than 40% insoluble in hot alcohol. Stimulant and antispasmodic. Is given in dysmenorrhœa as tincture 1 in 20. *Dose.*—½ to 1 drachm, suspended in water, with Mucilage of Acacia, or the tincture may be evaporated and equivalent of these doses given in *capsule* form. *See* also Mistura Morphinæ et Phenazoni Composita.

Fr. Cx. describes the two commercial varieties Canadian and Russian.

Guttæ Castorei Compositæ containing Tincture of Castor 1 ounce, Compound Chloroform Tincture 4 drachms, Compound Tincture of Lavender 1 ounce, Spirit of Camphor 4 drachms, Spirit of Nitrous Ether 1 ounce. A teaspoonful in water for nervousness or sleeplessness.

Catechu (*Off.*). *Syn.* Catechu Pallidum. Dried extract of leaves and young shoots of *Uncaria Gambier* (*Rubiaceæ*). Gambir, U.S., is the dried extract from *Ourouparia Gambir* (*Rubiaceæ*). Soluble in water to the extent of about 50% (U.S. 65%). Astringent in diarrhœa. *Dose.*—5 to 15 grains. **Tincture** 1 in 5, Alcohol 45% with Cinnamon 1 in 20. (Tinctura Gambir Composita, U.S.—*Average dose,* 1 drachm; 1 in 20 Diluted Alcohol with Saigon Cinnamon 1 in 40). **Trochiscus Catechu,** contains 1 grain. For relaxed throat.

Catechu Nigrum, *Off.* From Acacia Catechu. May be used in other parts of the Empire.

Caulophyllin. *Dose.*—1 to 4 grains. Resinoid from root of *Caulophyllum thalictroides*—blue cohosh, pappoose, or squaw root. Contains an alkaloid, which is chemically Methylcytisine, $C_{12}H_{16}ON_2$, M.Pt. 137° C. (Cytisine occurs in Laburnum seeds and in the common gorse.) It also contains two glucosides, which are saponins.—F. B. Power and A. H. Salway, C.D. i./13,202. Has diuretic, diaphoretic, anthelmintic properties, emmenagogue, and antispasmodic. It appears to exert a direct influence on the uterus, Liquid Extract made with Alcohol 70% N.F. 1=1. *Dose.*—8 minims. Examination of the fruit of.—P.J. ii./08,550.

Liquor Caulophylli et Pulsatillæ B.P.C *Dose.*—1 to 2 drachms Liquid Extract of Caulophyllum 25, Liquid Extract of Pulsatilla (1 = 1 with 60% Alcohol) 5, Glycerin 15, Alcohol 60% to 100.—P.J ii./10,393.

A sedative in dysmenorrhœa and uterine disorders.

Cedri Ligni Oleum chiefly from *Juniperus Virginiana* (*Coniferæ*; family *Cupressineæ*) yields a stearoptene Cedrene Camphor [$C_{15}H_{26}O$ = 222·283] and an oleoptene Cedrene $C_{15}H_{24}$ = 204·267, the odour of which is distinct and stronger than the Camphor, and taste finally peppery. Oil largely used in perfumery, also, in a thickened form by concentration in vacuo, in microscopical work with oil immersion lenses. **Paraffinum Liquidum,** is also used for this. It is excellent for the purpose.—Rowntree, Jl. Path. & Bact., 1908.

It is also the product of distillation of chip shavings and sawdust of pencil cedar (*J. americana* and *J. bermudiana*). It resinifies rapidly and is suggested as an addition to Paraffin for burns.—M. Hartog, L. i./17,475.

Cedrus Atlantica. The essential oil distilled from the wood. *Syn.* **Libanol.** Sp. Gr. 0·9517. $[\alpha]_D$ = + 48° at 20° C. Soluble 1 in 3 to 4 of Alcohol 90%. 200 cases of blenorrhœa well treated with the oil instead of with Santal Wood Oil. Results equal in all respects to those obtained by other balsamic preparations.—F.N. 1909. Capsules contain 8 minims.

Dose.—Up to 6 per diem *p.c.* Said to be useful in phthisis, bronchitis and skin affections. **Ointment** 25% with Vaselin basis.—N.S.D.

Cera Alba is Yellow Wax (*Cera Flava*) bleached from the honeycomb of *Apis Mellifica* (*Hymenoptera*), M.pt. about 61—64° C. To detect paraffin char with Sulphuric Acid, which completely oxides the wax—leaving the paraffin unchanged—this may then be extracted with ether. Paraffin lowers the M.pt. A solution in carbon tetrachloride suggested to spray the hands to form a coating for surgeons' use prior to operation.—L. ii./07,934.

Cera Aseptica. Horsley's Wax. An aseptic wax for surgeons' use.—Yellow Wax 7, Carbolic Acid 1, Olive Oil 2. It is employed warm at a temperature such that its consistence is just sufficiently soft for easy manipulation. It is heated at temperature of boiling water 5 minutes and then poured into Saline or Mercuric Chloride solution at 105° F. from which it is used during the operation.—P. Sargent, B.M.J. ii./22,1200.

Oxycroceum Plaster. P. Helv. Yellow Wax 35, Colophony 25, Elemi 10, Galbanum 5, Myrrh 5, Resin 12, Crocus 1, Extract Rhatany 2. Modified formulæ are given in P. Edin. and P. Lond.

Cereus (Cactus) Grandiflorus (*Night-blooming Cereus*).—Used in asthenic conditions of heart and dropsy.—B.M.J. i./90,70. Liquid Extract (imported), 1=1. *Dose.*—1 to 10 minims. Tincture, fresh flowers and young stems 1, alcohol 4. *Dose.*—2 to 10, increased to 30 minims. Has been lauded in the past as a cardiac tonic, free from cumulative or narcotic action, but evidence of utility is doubtful.

Cerii Oxalas. U.S., Ph. Ned., Jap., $Ce_2(C_2O_4)_3$, $9H_2O$ = 706·674. *Syn.* CER OXYDULOXALAT (German). $10H_2O$ is considered more correct than 9. *Average dose.*—3 grains (U.S.) A white crystalline powder insoluble in water. When incinerated it loses 53% of its weight. *Uses.*—Is given in vomiting, particularly that of pregnancy, also in chronic diarrhœa, hysteria epilepsy and migraine.

In sea sickness and more especially in vomiting due to utero-gestation Cerium Oxalate in doses of 2 to 3 grains mixed with powdered sugar given every 2 or 3 hours has proved of use.

Cerii Sulphocarbolas. *Syn.* CERII PHENOL-SULPHONAS. *Dose.*—1 to 5 grains (0·06 to 0·3 Gm.) $Ce_2[C_6H_4(OH)SO_3]_6$ = 1319·28 (+Aq.).

A well-defined crystalline salt resembling the corresponding thorium body in appearance, suggested for therapeutic use by G. T. Morgan. Further chemical data on Cerium Compounds, *vide* Vol. II.

Cerium salts in tuberculosis, 2 to 5 Cc. intravenous doses of 2% solution of the sulphates of Samarium, Neodymium and Praseodymium.—Pres Feb./21,109.

Cetaceum, Spermaceti. *Syn.* **Blanc de Baleine** FR. CX. White unctuous crystalline substance (M.pt. 46—50° C.), obtained from *Physeter Macrocephalus* and other species of whale, *e.g.*, *Hyperoodion rostratus.*—P.J. ii./13,68. The spermaceti from the latter is somewhat harder and quite equal in quality. Consists chiefly of Cetyl Palmitate, $C_{15}H_{31}CO.OC_{16}H_{33}$ = 480·672. Soluble in chloroform 1 in 1½ and in Ether about 1 in 7, also in hot alcohol. Is contained in Cold Cream *q.v.* Unguentum Cetacei (*Off.*). Now contains Liquid Paraffin in place of Benzoin and Almond Oil. Cetaceum injected warm (40° C.) the night before the operation on thin-walled cysts, after tapping and washing out with warm water.—B.M.J. i./06,154. More suitable as an addition to theobroma suppository mass than wax, which should not be used beyond 10% addition.—C.D. ii./04,498.

Cetraria Islandica (*Discomycetes* or *Discolichenes*), **Iceland Moss** was at one time used as a "throat remedy," in form of decoction, jelly, or lozenge, and was Official in the British Pharmacopœia 1885. The moss contains Cetrarin 3% Lichenin, $C_{12}H_{20}O_{10}$ = 324·22 45%, Amylaceous Fibrin 36%, Gum 4%, Non-crystallisable Sugar 4%, Water and Salts (inorganic) 8%. Lichenin is a starch-like body which has been shown to consist of two elements soluble in hot water,—one of which is also soluble in cold water. The bitter tonic principle Cetrarin $C_{18}H_{16}O_8$ (Schmidt) = 360·218 is extracted by hot water and gives the characteristic taste to the decoction. *Dose*, 2 to 4 grains. A white micro-crystalline powder, soluble in alcohol, slightly so in water and ether. A bitter tonic and laxative in constipation of chlorosis and anæmia. **Lichenoids** composed of Iceland Moss lubricate and soothe the mucous membrane of the throat. To be slowly dissolved in the mouth, suitable in inflammatory and excitable states of fauces and oropharynx, especially to speakers who suffer

with dry mouth and throat. As a sialogogue they are excellent correctives in pyrosis.

Chaparro Amargosa. Bitter Bush. *Syn.* **Castela Nicholsoni.**—a wild plant of South Texas and Mexico. Decoction a heaped teaspoon of twigs and leaves or root bark or decorticated root in 20 ozs. of water, boiled for 15 to 30 minutes. Enema also used as above. The drink as above taken thrice daily. *E. Histolytica* carriers treated. Results not very convincing.—S. Shepheard and D. G. Lillie, L. i./18,501. For this and other Mexican herbs see E. M. Holmes, C. & D., Jany. 8, 1921, p. 40. Compares very favourably with Emetine in treatment of amœbic dysentery.—A. W. Sellards and L. Leiva, per Jl. Trop. Med., May 1/23,145; B.M.J.E. i./23,57.

Cheiranthus Cheiri (*Cruciferæ*, Wallflower).—This plant is stated to contain a Digitalis-like glucoside of such power that 0·0005 Gm. will produce systolic cardiac arrest in the frog—also an alkaloid cheirinin which acts on nerve centres and on muscles—U.S.D.

Chekan—The leaves of *Myrtus Chekan* are aromatic and expectorant; used in chronic coughs and bronchitis. *Dose*, of fluid extract, ½ to 3 drachms.

Chelidonium Majus.—GREATER CELANDINE.—The yellow milky juice is an old remedy for warts and opacities of the cornea. The freshly expressed juice preserved by ½% by volume of chloroform has been much used as a remedy for cancer, given internally in dose of 10 to 60 minims, and in some cases with striking results. A fluid extract (*Dose.*—10 to 30 minims) from the dried plant has been used for injection into diseased tissue, and, diluted, as a lotion. An alkaloid, Chelidonine, $C_{20}H_{19}NO_5,H_2O$ = 371·276, has been isolated, melting at 135° C. forming a Hydrochloride, $C_{20}H_{19}NO_5HCl$ = 389·728 and a Sulphate $(C_{20}H_{19}NO_5)_2H_2SO_4$ = 804·596 in minute yellowish granular crystals; have been used as morphine substitutes in cancer. *Dose*, 3 grains twice a day.—P·J. ii./01,317,361.

Chenopodium Anthelminticum. *Linne* (*Chenopodiaceæ*). Contains a Volatile Oil, Official in U.S. *Average Dose*, 3 minims. For round worms-10 minims on sugar or in emulsion; has also been tried with good results in ascarides, giving 0·25 to 0·5 gram in sugar and water, and following this in an hour or two with a dose of castor oil. The treatment may be repeated after a day's interval. The fresh plant contains chenopodine an alkaloid. Liquid Extract 1 = 1. *Dose.*—½ to 1 drachm.

Experiments showed that 1 in 10,000 of the Oil kills living ascarides, while Eucalyptol does not kill in several days in 1 in 2,000 Solution.—H. Brüning.

For ankylostomiasis best taken in conjunction with Thymol at suitable interval. *Dose* 16 minims in two capsules followed by 2 ounces of Castor Oil in 4 hours. Thymol in doses of 5 grains.—Recent report on public health of Jamaica, C.D. January 13/17.

Uncinariasis Commission of the Orient. Chenopodium Oil in small doses more efficient than similar dose of Thymol.—L. i./21,235.

The maximum individual dose for hookworm appears to be 1 Cc., but three capsules, each containing 0·5 Cc., may be given at two-hourly intervals, followed three hours later by 1 ounce of Magnesium Sulphate.—L. i./22,1057.

Intimate relation between malaria and hookworm, the latter responding well to Chenopodium Oil in three ½Cc. doses. Chenopodium Oil preferable to Thymol, though the after-effects—giddiness, deafness, burning in stomach and headache—of treatment were more pronounced.—Rockefeller Foundation, Report of Hookworm and Malaria Research, T.D.B. 18/21,117.

Death due to blocking of larynx with ascarides in a child 22 months old following dose of ½ minim of Chenopodium Oil, Epsom Salts and saline enema. Ascarides were issuing from the mouth 10 hours after death.—R. F. C. Caldwell, per T. D. B. 19/22,657.

Ankylostomiasis in Penang—treatment of. No food after 4 p.m. of day preceding administration of Chenopodium; water *ad lib*; 8 p.m. 1 oz. Magnesium Sulphate in water; 7 a.m. 2 Cc. Oil of Chenopodium; 9 a.m. 1 oz. Magnesium Sulphate in water. Patient to lie down and drink hot water slowly. Signs of collapse after Chenopodium treated with 1½ Cc. Pituitrin intramuscularly.—D. C. Richards, per Jl. Trop. Med., Feb. 15/23,69.

Need for campaigns. Chenopodium Oil is not well spoken of.—C. Lane, B.M.J. i./23,551.

The sole constituent of the oil which is active against hookworms is the organic peroxide, *ascaridole*.—T. A. Henry, C.D, Oct. 1921, p. 555; P.J. i./23,29; P.J. ii./21,349.

Ankylostomiasis in French Guiana. Of 200 cases treated 83·4% were cured by Chenopodium Oil 4 Cc. with Castor Oil.—E. L. Peyre, per Jl. Trop. Med., July 2/23,237.

Dangers of Oil of Chenopodium. Many cases of poisoning recorded—some fatal. No other drug should be given with the anthelmintic.—B.M.J.E.i./24,57.

20,000 worm cases treated by a fresh mixture of 1 part with 7 of Carbon Tetrachloride.—Jl. Trop. Med., Feb. 1/24,31.

Chirata.—*Swertia Chirata* (*Gentianaceæ*). Entire plant. Bitter tonic given in indigestion for anorexia and torpid liver with constipation. *Dose* of powder 20 grains. Fluidextract, U.S. VIII. *Average dose.*—15 minims. Tincture (*Off.*) 1 in 10 Alcohol 60%. *Dose.*—½ to 1 drachm. Might be made with Alcohol 45%—P.J. ii./09,142. Infusion (*Off.*) 1 in 20. *Dose.*—½ to 1 ounce.

Japanese Chiretta. Swertia Chinensis is more bitter than the official.—V. Cofman B.P. Conf. 1919.

Chlorophyll.—The green colouring matter of plants extracted first by ether, then alcohol—in which latter the chlorophyll is soluble, leaving the waxy matter behind, or it can be produced by Acetone extraction. Supplied commercially in solid extract and liquid form. Oil soluble and water soluble varieties are available.

✱**Phyllosan** (T.M. 409946) **Tablets** each containing 0·03 Gm. Chlorophyll and 0·005 Gm. of iron. For the treatment of anæmia, chlorosis and wasting diseases.

Chlorophyll contains no iron in itself but bears some close relation to iron, for it cannot be formed in a plant from which iron is excluded. It contains Magnesium, and perhaps this supplies to the component parts of Chlorophyll the same cement which iron is said to give to the hæmoglobin molecule. Phylloporphyrin $C_{16}H_{18}N_2O$, one of the decomposition products of Chlorophyll, has a close relationship to Hæmatoporphyrin $C_{16}H_{18}N_2O_3$, an iron-free decomposition product of Hæmoglobin. Going a stage further, Hæmopyrrol $C_8H_{13}N$ can be obtained from both. Bürgi claims that Chlorophyll may be used to aid Hæmoglobin production in the body. The *Lancet* inquires why is it necessary to pay for a pure drug when there are vegetables available? It is shown that we get better results from our iron pill and fresh vegetables than from Hæmoglobin preparations. In only one vegetable is Chlorophyll available in large quantities, namely spinach, and even in this it is thought to be so held up in the plant as to be not readily available for man.—L. i./22,23,90. B.M.J. i./22,317.

Chondrus Crispus (*Gigartinaceæ*), U.S. Irish Moss. **Carrageen, Ph. Ned., P. Belg.** Employed as decoction, Moss ½ ounce Water 1½ pints boiled down to 1 pint. Flavoured with a little sugar and lemon juice. Demulcent and nutritive. Contains about 60% Carbohydrate, 7% Protein, and 10% more or less of ash.

Cicuta Virosa (*Umbelliferæ*), Water Hemlock, Cowbane, or Wild Parsley. contains Cicutoxin, a substance giving rise to convulsions by action on the spinal medulla. Poisonous to some animals, though eaten by sheep without killing them. Cases of poisoning.—G. A. Stutterheim, Pharm. Weekblad 1918, abst. Y.B.P. 1919, 179.

Cimicifugæ Rhizoma (B.P. 1898), U.S. *Dose.*—15 grains. The rhizome and rootlets of *Cimicifuga racemosa*, *Actæa racemosa* (Linn.), black snakeroot or black cohosh. Indigenous to the United States and Canada. Contains the resinoid Cimicifugin, also a small quantity of Isoferulic (hesperetic) Acid and a trace of an alkaloidal body.—P.J. ii./09,154; ii./10,142. *Dose.*—1 to 6 grains in pill. Useful in chronic rheumatism where one part of a tendon, muscle, or articulation is painful, or where the disease is traceable to previous affection; also in lumbago, sciatica, chorea, and amenorrhœa: also as a tonic and antispasmodic, and to excite contraction of the uterus (?) **Liquid Extract** (B.P. 1898). 1 = 1 of Cimicifuga exhausted with 90% alcohol. *Dose.*—5 to 30 minims. **Fluidextract U.S.** 1 = 1½. *Average Dose.*—15 minims. U.S. IX. has also (powdered) **extract** (*Dose* 4 grains) made by extracting the drug with alcohol 94·9% by vol. and diluting with dry starch, so that 1 of extract = 4 of drug. **Tincture.** (B.P. 1898). *Syn.* TINCTURA ACTÆÆ. 1 in 10 of 60% alcohol. U.S. 1 in 5 alcohol (94·9% vol.). *Dose.*—30 to 60 minims or 5 minims every hour. *Flavoring* Syl Vanillæ, Syl Rosæ; Syrupus Aromaticus.

In rheumatoid arthritis Sydney Ringer recommended 15 minims of tincture with 5 minims of tincture of gelsemium thrice a day.—Pr., Nov., 1910.

Snake Root, in India, is termed *bo boni*, has the appearance of dried ginger, and is white in section. It is eaten in pieces size of a pea after poisoning.

The snake charmers use it to stupefy snakes. (This Indian snake root has evidently no connection with Cimicifuga.) 'Snake stone' is said to be obtained from a frog,—it is also used in India after poisoning.—It is stated to "cure."—For details see L. i./11,892,1535.

In chorea Liquid Extract of Cimicifuga from fresh herb in ½ to 3 m. doses for a child 12 years. Liquid Extract of Gelsemium, 1/3 to 1 minim may be given in conjunction, as also Liquid Extract of Scutellaria laterifolia—a reliable sedative. 2 minims for a dose for a child. Should insomnia be present give Hyoscyamus (not mixed with the above)—3 to 4 minims of Tincture in water every half hour, beginning late afternoon until sleep occurs. —Pres., July, 1913, 244.

Cocillana (*Guarea Rusbyi*). The bark of a South American plant, stated to equal ipecacuanha in expectorant properties and to be, in addition, tonic and laxative. Ⓟ Syrup of Cocillana Compound a specialty. Each drachm containing Tincture of Cocillana 5 minims. Tincture of Euphorbia Pilulifera 15 minims, Syrup of Wild Lettuce 15 minims, Compound Syrup of Squill U.S. 3 minims, Cascarin 1 grain, Heroin Hydrochloride $\frac{1}{24}$ grain, Menthol $\frac{1}{100}$ grain. *Dose.*—½ to 1 drachm.

Cochlearia Armoracia, fresh Horseradish Root. Sialogogue, stomachic, and slightly diaphoretic. Yields pungent volatile oil on moistening or rasping. Used as **Spiritus Armoraciæ Compositus** (*Off.*).

Collinsonia Canadensis.—The root of this, commonly known as stone-root or knob-root, Heal-all, Hardhack, in America, has been employed in gravel and other urinary affections. Is an antispasmodic in flatulent, infantile, and biliary colic, and locally in lax conditions of the uvula, pharynx, and vocal cords. Tincture, 1 in 10 of alcohol 60%. *Dose.*—½ to 2 drachms. Liquid Extract, 1 in 1. *Dose.*—15 to 30 minims. Suppositories containing 20 to 30 grains of the powder are also used. Has also been employed in cancer of stomach and cystitis. The early colonists in America probably used the fresh root for 'the liver.' The tincture is said to be really useful—something of the Podophyllum effect without griping.—C.D., April 13, 1907. Under the name **Helalin**, Liquid Extracts are prepared containing, in addition, Cascara, and Pepsin as hepatic stimulants. *Dose* of each 1 drachm.

Condurango Cortex, P.G.V.—*Dose*, in powder, 15 to 60 grains (1 to 4 Gm.). The stem bark probably of *Marsdenia cundurango, Reichenbach fil.* from Peru. Is bitter and acrid. ***Uses.***—Alterative, a supposed specific for cancer, syphilis, and dyspepsia, and with hydrochloric acid in enuresis, is a stomachic and stimulant. **Extractum Liquidum**, B.P.C., 1901. 1 = 1 of Bark in 60 powder exhausted with 60% alcohol. *Dose.*—10 to 60 minims. Alcohol 45% is a good menstruum.—P.J. i./01,747. **Infusum**, 1 in 20 of hot water. *Dose.*—½ to 2 ounces (15 to 60 Cc.). **Vinum, P.G.V.** 1 in 10 Sherry. Macerate 8 days. Fluidextract of Condurango 1, Malaga 9 (P. Austr.). *Dose.*—½ to 1 ounce (15 to 30 Cc.). **Tincture** 1 in 10 Alcohol 60%. *Dose* as last.

Convallaria Majalis (*Liliaceæ*). LILY OF THE VALLEY.—(Entire plant). Two glucosides have been obtained from the plant; **Convallarin** $C_{34}H_{62}O_{11}$. (Walz) = 646·666, a purgative without cardiac action. *Dose.*—3 to 4 grains; and **Convallamarin** $C_{23}H_{44}O_{12}$ (Walz) = 512·350. *Dose.*—½ to 2 grains. Convallamarin is a cardiac stimulant and diuretic and has been used in preventing arrest of circulation in chloroform narcosis. Its action is so feeble as to be almost of no value in medicine.—G. Sharp. P.J. i./16,347.

The juice of the plant was found to contain 0·45 % Convallamarin and 0·12% Convallarin.—P.J. ii./04,967. **Tincture**, B.P.C *Dose.*—5 to 20 minims, 1 of flowers in 8 of Alcohol 60%. The drug is an old remedy for dropsy, and used in organic heart and renal affections. *cf.* Action of Digitalis. Aqueous **Extract.** *Dose.* — 2 to 8 grains, in pill. **Fluid-Extract** U.S. *Average dose*, 8 minims. 1=1 of dried rhizome and roots. Flowers preferred to roots, as latter contain little glucoside.—P.J. ii./99,622.

In mitral stenosis a remedy with some advantages—it does not produce nausea. It is well to commence with small doses, *e.g* , 10 minims of Tincture. —Pr., August, '12,212.

Glyco-Gelatin Pastils contain 2 minims of tincture. These dissolve slowly and are hence very useful for prolonged cardiac action.

Coriandri Fructus. *Dose.*—20 to 60 grains. Dried ripe fruit, *Coriandrum sativum* (*Umbelliferæ*). Aromatic and carminative. **Oleum Coriandri** (*Off*). *Dose.*—½ to 3 minims, Sp. Gr. 0·87 to 0·885. A sample we examined 1914

had Sp. Gr. 0·888. Is contained in preparations of rhubarb and senna to prevent griping.

Aqua Carminativa P. Austr.—Peppermint Leaves, Roman Chamomile Flowers, Fennel Fruit, Coriander Fruit, Caraway, Orange Peel, of each 15. Distil *secundum artem* to produce 1,000. A pleasantly flavoured aromatic water.

Coronilla varia.—An aqueous extract of the leaves and flowering tops is used as a remedy in many cardiac affections. It possesses the great advantage over digitalis and strophanthus that it does not derange the digestive functions. *Dose of extract* is 1½ grains (0·1 Gm.) three or four times daily. The active principle Coronilline lessens frequency of the pulse, kills by cardiac paralysis. Tincture 1 in 8, by percolation. *Dose.*—30 to 60 minims.

Costos. The root of this tree of which the Kashmir Government have the monopoly, contains a small amount of Essential Oil (we obtained 0·015%). In the powdered condition it has been much used for preserving shawls, furs, etc., from moth. The oil is of peculiar odor and has been much used as a basis for perfumes: the powder for sachets.

Crocus, Saffron (B P., 1898). The dried stigmas and tops of the styles of *Crocus sativus* (*Iridaceæ*) Linn. Every filament should give a blue colour on placing in Sulphuric Acid.—Mann. It is a curious old delusion that saffron tends to bring out the rash of measles.

Cucumis (*Sativus*).—**Cucumber.**—The juice of the fruit is in French Codex to prepare **Ungentum Cucumeris**—*Syn.*—Fr. POMMADE AUX CONCOMBRES: Cucumber Juice 1,200, Lard 1,000, Veal Suet 600, Balsam of Tolu in Alcohol 90%. *q.s.*, 2, Rose Water 10. A cooling ointment, used like cold cream.

Cucurbitæ Semina Præparatæ. MELON PUMPKIN SEEDS. *Off.*—*Dose.*—3 to 4 oz. bruised with water or milk. Fresh ripe seeds of *C. maxima.* (*Cucurbitaceæ*), deprived of testa and tegmen. Anthelmintic.—Give first a saline purge and afterwards Castor Oil. The oil of the seeds ½ ounce, repeated at 2 hours also efficient.—Ghosh

℗ **Curara.** *Syn.* CURARE, OURARI, URARI, WOURARA, WOURALI. *Dose* —$\frac{1}{20}$ to ½ grain. The South American Indian arrow-poison, produced from species of *Strychnos* and other plants (*Loganiaceæ*). A blackish-brown dry extract, with bitter taste; contains some resin, but is nearly all soluble in water.

Two varieties of Curare are said to be made, one from the fresh bark of the branches of *S. Gubleri*, strong (for larger animals) and the other (weak, for small birds, &c.), from *S. toxifera.*—P.J. ii./06,381.

Curare is an extract of different plants of which the active principle is derived from the bark of various kinds of a Liana-like South American *Strychnos*, Commercial "Calabash" Curare is derived from *S. Toxifera*: "Pot" Curare from *S. Castelnaei* together with *Cocculus Toxiferus* (*Menispermaceæ*), while "Tube" Curare is from unknown plants.—B.M.J. ii./11,218.

Use of Woorali as arrow poison in South America.—Sir J. Bland-Sutton, B.M.J. ii./22,932.

Antidotes.—(There is no tetanus—poisoning is not like that of Strychnine.) Artificial Respiration, Stimulants—brandy, hot gin, sal volatile freely. Ligature if wound; this may be cautiously loosened and tightened again to admit a little of the poison at a time to the system. Wash the wound.—Murrell.

This and Curarine have been given hypodermically in hydrophobia and for strychnine poisoning. For tetanus, a case cured.—L. ii./04,831.

Tetanus treated by Curare after antitoxin had failed. Subcutaneous injections starting with two milligrammes and increased daily up to five milligrammes. An attempt to raise the dose to six milligrammes led to transient paralysis of the respiratory muscles, causing considerable dyspnœa. The dose of 5 mgr. was continued. The convulsions which sometimes occurred every hour subsided after the injections. Patient received 63 mgr. in 14 days.—B.M.J.E. i./21,93.

℗ **Hypodermic Injection.** 10%. *Dose.*—1 to 6 minims. Use recently boiled distilled water, *q.s.*, to form a thin paste, transfer to a funnel plugged with absorbent wool, and gradually add water *q.s.* ℗ **Hypodermic Tablets** contain $\frac{1}{12}$ grain of Curare.

Murder conspiracy against the Prime Minister and Mr. A. Henderson. At the Old Bailey in March, 1917, Alice Wheeldon, her two daughters, and Alfred George Mason, chemist and druggist, husband of one of the daughters, were found guilty of poison conspiracy. The unmarried daughter, Hettie Wheeldon, was acquitted. The following sentences of penal servitude were

inflicted:—Mrs. Wheeldon, ten years; Alfred George Mason, seven years; and Winnie Mason, five years. It was proved that phials containing solution of strychnine hydrochloride and a preparation of curare had been supplied by Alfred George Mason, who was a lecturer on pharmacy in a technical school at Southampton. The defence advanced the theory that these poisions were intended to poison dogs.

In the course of the proceedings it was stated that no fatal case has been recorded in literature of curare poisoning.

℗ **Curarina.** $C_{19}H_{26}N_2O$ = 298·319. Another formula:—$C_{18}H_{35}N$. *Dose.*—$\frac{1}{100}$ to $\frac{1}{40}$ grain (?). This, the active principle of Curare, is a powerful poison, in yellowish powder soluble in water and alcohol. Researches on Curare.—P.J., 1890,893,471; L. i./91,46.

Cusparíæ Cortex.—The dried bark of *C. Febrifuga. Syn.* Angostura Bark. Stimulant and tonic. In diarrhœa, dysentery and dyspepsia much employed in South America and West Indies. *Dose* of powdered bark, 10 to 30 grains. The Bark is stated to contain Cusparine $C_{20}H_{19}NO_2$, Cuspareine $C_{18}H_{19}NO_2$, and Galipoidine $C_{19}H_{15}NO_3$.

Cydoniæ Vulgaris Semina resemble apple pips. They contain in the epithelium a gum—Cydonin—about 20% of the weight of the dry seeds. One part of the seeds, rubbed in a cloth to free them from dirt, with 40 of water, yields a thick jelly-like mass used as mucilaginous agent in toilet preparations. **Mucilage** of quince is official in some Pharmacopœias, the strength varying from 1 in 25 in the Austr., to 1 in 100 in the Belg. The strength of 1 in 50 of cold water or rose-water is the one generally preferred. Macerate with the cold water for from ½ to 2 hours, and strain without expression. **Decoction** of quince is a similar preparation made by boiling for ten minutes. Glycerin, Carbolic Acid, Boric Acid, Salicylic Acid, Sodium Benzoate, or other preservative is necessary. Such 'Creams' are Medicated with Witch Hazel, Borax, or Tincture of Benzoin. Irish Moss Decoction, 1 in 30 is similarly employed.

Cynoglossum Officinalis, *Hound's tongue* (*Boraginaceæ*). Has demulcent properties. Often acts similarly to Curare.—L. i./06,974.

Cyperus Rotundus (*Cyperaceæ*), SINGHALESE **Kalandura.**

A rushlike plant, carminative, stomachic, and hepatic stimulant. A popular remedy in Ceylon. An infusion of the tubers of the plant mostly employed. Increases flow of saliva when chewed. On the intestinal membrane it is astringent and styptic. The natives use it for epistaxis. In dysentery, bronchitis, tonsillitis, and all forms of fever, both alone and in combination with other drugs.—B.M.J. i./07,327. We found the root to contain a considerable quantity of Volatile Oil of odour strongly resembling Sandal Wood Oil. Known in the Sudan as Seid Oil. Examination.—Joseph & Whitfield, J.S.C.I., 1922,41,172. It is contained in Syr. Aegle Marmelos Co.

Liquid Extract. *Dose.*—15 to 60 minims 1=1 prepared by Alcohol Extraction. This preparation brings out the Santal-like smelling constituent.

Flavoring.—Syl Pini; Extractum Glycyrrhizæ Liquidum.

Gelatin Capsules are prepared containing 5 minims of Liquid Extract.

Cypress Oil. The oil of various species has been substituted intentionally or carelessly, *e.g.*, *C. Lusitanica* gives a larger percentage of oil and is cheaper —E. M. Holmes, P.J. i./23,107. It is employed to give persistence in perfumery.—W. A. Poucher, *ibid.* 181.

Cypripedium. *Dose.*—15 grains. Dried rhizome and roots of *C. hirsutum* and *C. parviflorum* (*Orchidaceæ*). In nervous affections, hysteria, hypochondriasis and epilepsy. **Cypripedin.** *Dose.*—1 to 3 grains. The dried extract of *Cypripedium pubescens*, Ladies' Slipper.

℗ **Cytisine.** $C_{11}H_{14}N_2O$ = 190·183. *Syn.* Ulexine. Is an alkaloid obtained from *Cytisus Laburnum.* It is also present in *Ulex europæus*—the common furze. ℗ Cytisine Hydrobromide, a freely soluble salt, *dose*, $\frac{1}{20}$ to $\frac{1}{8}$ grain, has diuretic properties. It benumbs the tongue. The Glucoside contained in small dose produces hyper-excitability. Mild doses feeble cardiac tonic—diuretic. Poisoning by Laburnum Seeds. Expectant treatment and recovery.—B.M.J. ii./17,676. Lice have been killed with cytisine *vide* Pediculi, Therap. Ind.

Damiana. *Syn.* "BOHADSCHIA" (APHRODISIACA), HYSTERIONICA, BAYLAHUEN. The leaves of *Turnera diffusa var. aphrodisiaca* and other species (*Turneraceæ*) are recommended in the United States as possessing aphrodisiac properties. Useful in melancholia. Said to be tonic and diuretic. Contains bitter substances, resins, and volatile oil.

Liquid Extract of Damiana, 1=1, made with alcohol 60%. *Dose.*—½ to 1 drachm. ***Flavoring.***—Glyl Pini, Syl Rosæ, Syl Lavandulæ. **Extract** *Dose.*—2 to 10 grains. **Capsules** are each equivalent to 30 minims of the liquid extract. Ⓟ**Mistura Damianæ Compositа.** *Dose.*—1 to 2 drachms. Sodium Hypophosphite 5 grains, Calcium Hypophosphite 5 grains, Liquid Extract of Damiana ½ drachm, Liquid Extract of Nux Vomica 2 minims, Chloroform Water to 2 drachms. Ⓟ**Pilula Damianæ Compositа.** Extract of Damiana 2, Phosphorus $\frac{1}{100}$, Extract of Nux Vomica ⅛. Liquorice Powder *q.s.* to 3½ grains. *Dose.*—One, two, or three times a day.

Dammar as used in this country for varnish making and for microscopic work is the East Indian Dammar from *D. Orientalis.*—It occurs in small yellow resinous pieces somewhat larger than wheat. It is partially soluble in alcohol and soluble in chloroform.

Dictamnus Fraxinella. Bastard Dittany (*Rutaceæ*) Root used.

Divi-Divi. A dye extracted from the seed pod of a small tree growing wild in the peninsula of Goajira (Venezuela). Latterly it has reached this country again instead of going to Hamburg for distribution.—C.D.

Dragon's Blood.—Resin from *Dæmonorops Draco* is the chief ingredient in mahogany varnishes. Distinguishes Benzine from Benzol, *cf.* Benzol.

Drosera rotundifolia.—The leaves of Sundew (Fr. Cx. entire plant), yield a greenish-brown, odorous, very acrid resin, Glucose, Citric Acid, and probably Malic Acid, and a ferment which converts Albumen into Peptone. Have been recommended for chronic bronchitis, asthma, pertussis, and to ease the cough of phthisis. Tincture, 1 in 10 of proof spirit. *Dose.*—1 to 10 minims Fr. Cx. 1 in 5 alcohol 60%. In pertussis, small doses of the 1 in 10 Tincture to be given.

Echium Vulgare (*Boraginaceæ*) **Vipers' bugloss** has some relationship to Curare in action, causes same symptoms as alkanet *q.v.* with more hyperæsthesia and greater weakness of the muscles.—*Vide* L. i./06,974.

Elaterium (B.P. 1898). *Dose.*—$\frac{1}{10}$ to ½ grain. The dried sediment from the juice of fruit of *Ecballium Elaterium* (*Cucurbitaceæ*). A powerful hydragogue cathartic, useful in renal or cardiac disease complicated with dropsy. In Cyprus we understand the peasants take the fresh juice of the fruits by the nostrils for jaundice.—Ph. Notes. **Pilula Elaterii Compositа,** St. Bart's H. Elaterium ¼ grain, Compound Extract of Colocynth 2 grains, Calomel 1½ grains, Capsicum ½ grain. **Tinctura Elaterii Compositа.** *Dose.*—10 to 30 minims. Elaterium in powder 1, Chloroform 50, macerate 2 days, then add Alcohol (90%) 200, and Compound Tincture of Cardamoms 250, macerate 5 days more and filter. Is more active than a corresponding dose of the powder.

Elaterinum. (B.P., 1898, **U.S.**). *Syn.* Momordicin. $C_{20}H_{28}O_5 = 348{\cdot}324$. *Dose.*—$\frac{1}{40}$ to $\frac{1}{10}$ grain. The crystalline neutral active principle (to extent of at least 20%) of Elaterium, insoluble in water, soluble in chloroform (about 1 in 12) and sparingly in alcohol. For a full consideration of the Chemistry of Elaterin, see Edn. XV., p. 815. **Pulvis Elaterini Compositus** (B.P., 1898). Elaterin 1, Milk Sugar 39. *Dose.*—1 to 4 grains.

Embelia, *Off.* *Dose.*—1 to 4 drachms. Dried fruit of *E. ribes* and *E. robusta* (*Myrsinaceæ*). Anthelmintic, especially for tapeworm. Contains about 2·5% Embelic Acid $C_{18}H_{28}O_4$—yellow crystals soluble in alcohol, etc. Ammonium Embelate has been used as a tænifuge in dose 3 to 6 grains (0·2 to 0·4 Gm.) with Castor Oil both before and after.

Emblicæ Fructus. *Dose.*—One, two, or more as required. The fruit preserved in syrup, or crystallised in sugar, of *Myrobalanus emblica, Emblica officinalis,* Nelli, or Nilicamam. Used in India to excite the appetite, and taken after meals for atonic dyspepsia. In the fresh state, the fruit consists of a fleshy, acidulous pulp enveloping an angular nut. A mild purgative beneficial for children. **Black or Chebulic Myrobalans. Terminalia Chebula** (*Combretaceæ*), is *Off.* The dose of the powder ranges from a few grains to 2 dr. Dried mesocarp of the fruit is employed—astringent in action. Is used as a collyrium in catarrhal ophthalmia, also as ointment to the eye. It is a valuable styptic. Purgative in large doses (½ to 2 dr.), but may constipate after purging. Reduces albumin and blood in the urine, and is said to have similar action on glucose. The natives employ this in perineal injuries caused during child-birth, eczematous sores and prolapsus ani—as gargle and dentifrice in spongy gums, and as injection in diarrhœa, internally stomachic and cholagogue. **Unguentum,** *Off.* (and Ⓟ CUM Opio, *Off.*), are equivalent to gall ointment (and with Opium *Off*)

The fruits of the various species of *Terminalia* (five principal varieties) are largely used in tanning. The kernels contain 36% to 37% of a non-drying oil.

Entada Scandens (*Leguminosæ*). The Pods and Seeds are used roasted as substitutes for Coffee. Stated to have purgative properties, but this is not confirmed.

Ephedrinæ Hydrochloridum. $C_{10}H_{15}NO.HCl = 201{\cdot}646$.

The salt of an alkaloid from *Ephedra vulgaris*, var. *Helvetica*, very soluble in water; 5 to 10% solution has mydriatic properties. The Constitution of Ephedrine, is OH.CHPh.CHMe.NHMe.—J.C.S.A. i.20.396.

Equisetum Arvense P. Austr. 'Cat's Tail.' The sterile shoots contain Equisetic Acid, said to be identical with Aconitic Acid.

Erigeron Canadense.—Fleabane. The oil distilled from this herb is official in U.S. *Dose.*—5 to 30 minims. Sp. Gr. 0·850 to 0·890. Capsules contain 5 minims, and a Liquid Extract of the leaves is prepared. *Dose.*—30 to 60 minims. Oil has been thought to have astringent and hæmostatic properties, especially in uterine, urinary and nephritic affections, dysuria, strangury. The fresh herb may yield 0·5% of the Essential oil, which on keeping will deposit resin and crystals.

Erodium Cicutarium. Storks-bill (Geraniaceæ). A *Liquid Extract*. *Dose* 15 minims three or four times daily, 1=1, has been used in Holland with good result instead of Hydrastis. Macerate 100 of the powdered herb in 60 of a mixture of Alcohol 90% and water *p. eq.* for 24 hours. Then percolate until 80 of percolate are secured. Reserve this and percolate to exhaustion. Evaporate this to 20 and add to the reserve.—P. Van der Wielen Pharm. Weekblad, 1915, No. 51, see also L. H. Van Berk, *ibid* July i./16. No. 27, C.D. ii./16.912. It has been advised for dropsy.—U.S.D.

Eryngium Maritimum. The Sea Holly. Decoction of fresh leaves, 1 in 10, preserved with 20 % Alcohol. *Dose.*—A wineglassful three times a day. For kidney or bladder trouble. The root of *E. campestre* is used for similar affections.

Erysimum. *Syn* **Sysimbrium Officinale** Fr. Cx. *Syn.* Herbe aux Chantres

An old remedy for hoarseness of voice. It possesses expectorant properties. A proprietary under the name **Sirop d'Erysimum.** *Dose.*—½ ounce thrice daily, preferably in a small teacup of infusion of the same plant, is praised for results in acute and chronic catarrhal laryngitis. Marked influence in cough pain, hoarseness, loss of speech, etc.

Esparto Grass from Spain and N. Africa is a source of wood pulp in paper making. It is boiled with Caustic Soda to dissolve away the fleshy parts, the fibrovascular tissue of the nature of wood being left. It is then bleached. The trade in the grass amounts to 200,000 tons per annum. A by-product of great value in the grass amounting to 3½% is a wax and oil mixture.—C. F. Cross, C.D. i./17,252.

Eucalypti Gummi (B P 98). *Syn* **Kino Eucalypti** (*Off.*). Red Gum. *Dose.*—5 to 20 grains in powder.

An exudation from *Eucalyptus rostrata* (*Myrtaceæ*), and other species. 80 to 90% of it is soluble in cold water, almost entirely soluble in Alcohol (90%). Used in diarrhœa, and relaxed throats, and as astringent generally.

To be distinguished from the common Australian or Botany Bay kino, said to be principally from *E. resinifera* (*Myrtaceæ*) The latter is very resinous and little soluble in water, was included as **Kino Eucalypti** in **I.C. Add.**

Decoction. *Dose.*—2 to 4 drachms, 1 in 40. Boil and strain. Used as gargle and for diarrhœa. **Liquid Extract, B.P.C.** *Dose.*—30 to 60 minims in water. Eucalyptus Gum 25, Distilled Water 65. Dissolve by constant shaking, strain and add Alcohol 90% 10 and water *q.s.* to 100. A styptic. **Insufflation** 50% in starch. A powerful astringent in hæmorrhage and relaxed conditions of the larynx and trachea. **Suppository,** 5 grains in each with cacao butter (pressed dry). **Syrup.** Liquid Extract of Eucalyptus Gum 5, Sugar 3 Dissolve. *Dose.*—30 to 60 minims. **Tincture.** 1 in Alcohol (90%) 4 by maceration. *Dose.*—20 to 40 minims. 1 to 7 of water as an astringent gargle.

External hæmorrhage of any form could probably be stopped by local use of this tincture combined with internal use of Calcium Chloride. It is exceedingly useful in dental work, and to cuts caused by accidental injury. **Trochisci Kino Eucalypti** *Off.* Contain 1 grain in each.

Trochisci Eucalypti Compositi.
Potassium Chlorate 2 grains, Cubeb Powder ¼ grain. Eucalyptus Gum 1 grain with fruit paste, and are marked C.E. Useful in congested and relaxed throats, especially when mucous secretion is arrested.

Eugenol, U.S.—Eugenic Acid, $C_{10}H_{12}O_2$ or $C_6H_3(OH).(OCH_3).C_3H_5$, 4 : 3 : 1 = 164·146.—A colourless oily liquid (B.Pt. 251° to 253° C.), darkening on exposure. It is the chief constituent found in oil of cloves. It has a strong clove odour, and is a powerful antiseptic and antiputrescent. Is employed by dentists. Causes reduced sensibility of mucous membrane, but not complete anæsthesia. Useful with wool fat in eczema.

Eupatorium. *Average dose,* 30 grains. Dried leaves and flowering tops of *Eupatorium perfoliatum* (*Compositæ*) Linné. Tonic and diaphoretic; in large doses, emetic and aperient. Employed in dyspepsia, and the infusion (1 in 20 *Dose.*—1 to 4 ounces or more) has been given in tapeworm. **Liquid extract,** 1 = 1. *Dose.*—30 minims.

Euphorbia Peplus (*Euphorbiaceæ*). PETTY SPURGE, DEVIL'S MILK.
In cases of dyspnœa whether of pulmonary or pneumo-gastric origin. Modifies secretion in asthma and suppresses attacks.

The plant in the fresh condition has an acrid juice, which, when carefully dried, imparts its virtues both to water and alcohol. **Decoction.** 45 grains of the entire herb to the pint. *Dose.*—1 teacupful (diluted if preferred) 3 or 4 times daily, preferably between meals. Flavoured *e.g.*, with Glyl Lavandulæ or Syl Rosæ.

Extract. *Dose.*—7½ to 30 grains. **Tincture.** (1 in 5 by 45% Alcohol.) *Dose.*—30 to 60 minims during the day.

Euphorbia Pilulifera. (*Euphorbiaceæ.*) Australian Snake Weed or Cat's Hair. For asthma, bronchial affections, paroxysmal dyspnœa, laryngeal spasm, whooping-cough, angina pectoris, in coryza, and hay fever.

44 lbs. yielded 1 drachm of Essential Oil—the only substance in it to which medicinal action could be attributed.—C.D. i./13,652.

F. B. Power and H. Browning examined the drug and obtained from it Gallic Acid, Quercetin $C_{15}H_{10}O_7$ and a new Phenolic substance $C_{28}H_{18}O_{15}$ also a glucoside and minute amount of alkaloid. They did not find any constituent to which specific action could be attributed.—P.J. i./13,506.

Extract (Aqueous). *Dose.*—½ to 1½ grains. **Tincture.** *Dose.*—10 to 30 minims. 1 in 5 of alcohol 60%.

Protozoal parasites of the genus herpetomona are widespread—the flagellate form is found in many insects also in the vegetable kingdom—in the latex of sprig of Euphorbia—very like the leishmania flagellate. A flagellate found in an edible plant such as lettuce may be a source of infection to man.—A. W. Sheen, Pr. Feb. 21, p. 85.

E. Pilulifera was first introduced by Carr-Boyd of Townsville, Queensland, in 1880 as an asthma remedy and became known as the 'Queensland Asthma Herb.' The plant that has passed under the name *Euphorbia Pilulifera* Linn, is really *E. hirta*, Linn. This alteration is awkward, but the difficulty can be lessened by using the name *Euphorbia Pilulifera Jacquin* as a synonym.—E. M. Holmes, P.J. i./23,162.

Fevillea cordifolia. N.O. *Cucurbitaceæ.* The Segra Plant (Snake Vine). The seeds, termed locally "Antidote Cocoon," are used as an antidote against snake and other poisons in Jamaica.

Ficus Carica.—The acrid sap of the common fig produces dermatitis on the skin. In Southern Europe the Sap is in use as a counter-irritant or vesicant. Occasionally it gives rise to ulceration.—B.M.J. ii./12,1139.

Fœniculi Fructus. Fennel. Dried ripe fruit of *Fœniculum vulgare N.O., Umbelliferæ* (cultivated) (*Off.*), contains Volatile oil. Congealing point not below +5° C.—U.S. *Dose.*—5 to 15 minims. Sp. Gr. 0.960 to 0·990. Sol. in an equal vol. of 90% aclohol. Constituent anethol, aromatic.

Given to infants in form of **Aqua Fœniculi.**

Fœnugreek. *Trigonellæ Fœnu-græci Semina* (*Leguminosæ*). The herb is largely grown in India and Egypt. Contains large proportion of mucilage and about 5% oil. Chief use, veterinary. An Egyptian preparation. *Helba,* is made from Fœnugreek Seeds—when soaked they swell into a pasty condition like a pudding—in Cairo this is hawked in the streets, and the cry of 'Helba' is a familiar one. A medical man goes so far as to call it the Quinine of Egypt—it prevents fever, and is valuable in many ways. It is stated to be comforting to the stomach. Stomach complaints in the Cairo district are common

—supposed to be due to the water, but more likely from colds and chills. The seeds may be ground to powder and swallowed in about 1 or 2 teaspoonful doses. Or the seeds infused in water for a few hours and the supernatant liquor employed. Or a handful of the seeds is soaked in a basin of water for from 12 to 24 hours ,then removed and placed in an unglazed flower-pot (which has been previously kept under water ½ hour) and allowed to sprout during 3 or 4 days. When the plant has grown to about 2 inches it is ready for use. It is eaten raw along with the seeds. This sprouted remedy is best and most employed. It has been tried in diabetes.—Geo. H. Stephenson, Cairo.

Fragaria Vesca. STRAWBERRY. Sprue treated with Ethereal Strawberry Extract. The use of strawberries for sprue is well known. Zilva showed that it was possible to extract by alcohol the fat-soluble factor from vegetables and that this extract also contained the antineurotic and to small extent the antiscorbutic factor. An Ether extract of the Alcohol extract contained a substance which promoted the recovery and renewed growth in rats declining on account of fat-soluble factor. Clinically, in typical sprue cases, with usual diet, has been found beneficial.—A. Castellani and K. C. Browning, B.M.J. i./22,718.

Frangula. *Rhamnus Frangula* Bark (*Rhamnaceæ*), Buckthorn Black Elder or Alder Buckthorn. It grows all over Europe and in America. Should be 1 year old. Contains Frangulin, Emodin, etc. Cathartic especially for hæmorrhoids and chronic constipation. Liquid Extract B.P. '85 and Fluid Extract U.S. 1=1. *Dose*, 1 to 4 drachms. Common Buckthorn in this country is *R. catharticus*.

Syrupus Rhamni, B P.C. *Dose*, ½ to 1 drachm. Is prepared from Common Buckthorn Berries. Evaporate fresh buckthorn berry juice 50 to 30 and set aside 12 hours, filter and dissolve sugar 65 in the filtrate with heat, strain and cool. Mix Strong Tincture of Ginger 0·52 with Alcohol 3·12, add to the Syrup and finally water to 100 by weight.

Fucus Vesiculosus (*Fucaceæ*). **Bladder** or **Sea Wrack.** Preparations of this, being rich in iodine, bromide, and chlorine salts, have had reputation for reducing corpulence. It is stated to contain a considerable amount of Mannite even 12% (?).—L. i./17,323. **Extract,** B.P.C. Exhaust the drug in No. 20 powder with alcohol 45% and evaporate. This contains about 3% of Iodine. (Fucus vesiculosus may contain as much as 0·21% of Iodine. The yield of extract is about 1 from 15). *Dose*, 3 to 10 grains before meals. in pills with althæa. **Liquid Extract,** B.P.C. 1=1 of Bladder Wrack in 45% Alcohol. *Dose*, 1 or 2 drachms before meals. It is recorded a lady lost 20 lb. in 9 weeks when taking the liquid extract; and a gentleman 8 lb. in 6 weeks; another 8 lb. in 3 weeks, without bad results.

In thyroid gland disease. In some experiments to determine the smallest quantities of various Iodine Compounds which when given to animals caused distinct changes in their resistance to Acetonitrile and at the same time to find out the maximum effect which could be obtained—bladder-wrack was found to rank first –it increases the thyroid secretion markedly. Iodine compounds affect the resistance of animals to Acetonitrile only through the thyroid gland. The Iodine of Fucus is 80 to 100 times as active as that of any other Compound studied in the investigation.—L. ii./10,842.

Seaweed, New sugar isolated from.—J.C.S.A. i./1909, p. 387.

Chronic subcutaneous fibrosis treated by Fucus combined with a more or less strict diabetic diet, exercise and massage.—B.M.J. i./11,354.

✱ *Integar Capsules* (T.M. 421774). *Dose.*—One or two at bedtime. A preparation of Fucus Vesiculosus, Ox Bile and Pancreatin. Laxative, cholagogue and intestinal antiseptic useful in intestinal catarrh and colitis.

Galangal (*Zingiberaceæ*). Indian Root, China Root in 2 varieties: 'large' from *Alpinia galanga*, Willd., and 'small' *A. officinarum*. *Dose.*—15 to 30 grains Aromatic tonic, Contained in 'Hippocras,' *q.v.*

Galbanum (B.P., 1898). *Dose.*—5 to 15 grains. Gum resin from *Ferula Galbaniflua* (*Umbelliferæ*) and other species. Expectorant and stimulant.

Persian Galbanum. The exact botanical source of varieties is uncertain —P. H. Marsden, P.J. ii. /15,356.

Galega officinalis, or goat's rue, has a reputation as a galactagogue when given to nursing women. An extract is prepared. *Dose.*—5 to 10 grains. **Tephrosia virginiana** is also known as goat's rue, but is not the drug intended for use.

Galega most effectual galactagogue, aside from sucking of the child.—R. Eyzaguirre, per Jl. Trop. Med. Nov. 1./22,348.

Galium Aparine.—The plant Cleavers or Goose Grass. Is acid, astringent, and diuretic. Has been used in dropsy, jaundice, scrofulous scaly eruptions, epilepsy, and obesity. Succus Galii. *Dose.*—1 to 2 drachms; and Extractum Galii, 5 to 20 grains. For psoriasis.

Galla. *Dose.*—7½ grains. Excrescences on *Quercus infectoria* (*Cupuliferæ*), caused by deposition of eggs of *Cynips Gallæ Tinctoriæ* (*Hymenoptera*), Astringent. Contain Tannic and Gallic Acids. **Unguendum Gallæ** (*Off.* and B.P., '98), 1 to 4 Benzoated Lard.

Gentianæ Radix.—Dried rhizome and roots of *Gentiana Lutea* (*Gentianaceæ*). A bitter tonic. Yields 30 to 40% of Aqueous Extractive. This is largely used as a pill excipient. Gentian (P. Jap.) is 'Ryutan.' Prior to the war came almost entirely from Central Europe but is now imported from Spain in considerable quantities. Prof. Greenish on Powdered Gentian.—P.J. i./12,201. Gentiopicrin $C_{16}H_{20}O_6$— an 'anthermic' glucoside is contained to extent of 1·5%. Has properties allied to quinine. *Dose.*—20 to 30 grains in malaria —Y.B.P.. 1913,127.

Pastilli Stomachici, P. Jap. IV., Sodium Bicarbonate 0·25 Gm., Ryutan 0·1 Gm.

Infusum Gentianæ Compositum (*Off.*) *Dose.*—½ to 1 ounce. An infusion of Gentian Root, Orange Peel and Fresh Lemon Peel. (Dry may be used in the Tropics.) For dispensing purposes it is convenient to fill strong half-pint bottles, plug the necks well with cotton wool, stand in suitable pan and heat to boiling point 10 minutes and allow to cool. So prepared, will keep for a week and more, and the flavour is not impaired by overheating. **Infusum Gentianæ Aromaticum.** (was Brompton H.), Gentian Root, 2 ounces, Lemon Peel 6 drachms, Orange Peel 3 drachms, Boiling Water 1 gallon. **Tinctura Amara.** P.G. iv. Gentian Root 3, Centaury Root 3, Orange Peel 2, Orange Berries 1, Zedoary Root 1, Diluted Alcohol (67 to 69% volume) to 50. **Mistura Gentianæ Alkalina.** Brompton H. Sodium Bicarbonate 15 grains, Gentian Infusion to 1 ounce. (℗ Previously contained Hydrocyanic Acid, 3 minims). **Fluidextractum Gentianæ U.S.** 1=1 by Diluted Alcohol. *Dose.*—15 minims (**0·9 Cc.**). **Elixir Gentianæ Acidum,** Martindale. *Dose.*—1 to 2 drachms in a little water Concentrated Compound Infusion of Gentian 20 minims, Taraxacum Juice 10 minims, Dilute Phosphoric Acid 2½ minims, Sherry 20 minims, Glycerin 7½ minims.

Preparation of Gentian Extract rich in Gentiopicrin.—P.J i./12,125.

✱**Gencydo.** (T.M. 424634). A preparation for hay fever made from plants containing lime salts and vegetable acids. (The lime treatment of hay fever is thought by some to be important.) *Ampoules* stated to contain Gentiopicrin 0·01 Gm., and Extractum Cydoniæ Seminum 0·01 Gm. for injection. A liquid containing the same ingredients is used as a paint for the nose, as also an ointment.

Geranium Maculatum (*Geraniaceæ*).—Cranesbill root, is a powerful astringent; contains about 16% of tannin; used in diarrhœa, and locally in relaxed conditions of the mucous membranes. Geranin, a dried extract, is given in dose of 1 to 5 grains Liquid extract, 1=1. *Average dose.*—15 minims.

Germanium Dioxide. An American method of treatment of pernicious anæmia, less toxic than arsenic. Causes in animals a distinct rise in the number of blood cells, but in practice the results were negative.—M. G. Alexander, B.M.J. ii./22,979.

Ginseng. The name applied in China to roots of probably several plants to which are attributed miraculous properties.

The active principle of Ginseng is a glucoside—extracted by pure Alcohol. —I. Saito and K. Abe, per Jl. Trop. Med., Mar. 1/23,85.

Glaucium Luteum.—Yellow-horned or Sea Poppy. 1 drachm of Liquid Extract in glycosuria gave good results. Hæmoglobin and red corpuscles increased considerably.—P.J. i./99.91; i /oo,222. The alkaloids Glaucine, Protopine, $C_{20}H_{17}NO_5$ = 351·244, and Chelerythrine, $C_{21}H_{17}NO_4$ = 347·249, are present.—Y.B.P., 1902.86.

Gloriosa Superba, *N.O. Liliaceæ.* A poisonous plant common in Upper Burmah. Contains Colchicine.— Clewer, Green and Tutin, J. C. S., 1915, 107.835; F. L. Pyman, C.D., July 31, 15,164.

Glucosides. Principles found mainly in plants, possessing the property of being converted into glucose or an allied sugar and one or more simpler or more complex products by the action of dilute acids, alkalis, enzymes or simply by heating with water and taking u the elements of water in th e

reaction,—*i.e.*, hydrolysis. Examples are Amygdalin, the Digitalis Glucosides, Phloridzin, Salicin; Bourquelot on.—B.M.J. i./21,59.

Glycogen $[C_6H_{10}O_5]n$—A body allied to starch. *Dose.*—1½ to 2 grains. It occurs in the liver, blood, horseflesh, &c It is said to be changed at death into glucose, maltose, and isomaltose; said to improve nutrition.—L.ii./03,345

Glycyrrhiza. *Dose.*—5 to 20 grains or more. The peeled root and subterranean stem of *G. glabra* (*Leguminosae*)—*Off.* U.S. has *G. glabra typica* (Spanish) and *G. glabra Glandulifera* (Russian). Aqueous extraction usually yields 24 to 38% **Solid Extract.** *Dose.*—5 to 60 grains. **Extract Liquid** (*Off.*) By cold exhaustion with Chloroform Water 1=1, contains ⅕ of its volume of 90% alcohol. *Dose.*—½ to 1 drachm. Incompatible with acids.

Elixir Pectorale.—*Syn.* **Liquor Pectoralis. P. Dan.** '93. King of Denmark's Chest Mixture. *Dose.*—1 drachm. Extract of Liquorice 1, Fennel Water 3, Anisated Liquid Ammonia 1.

(**Liquor Ammonii Anisatus.**—*Syn.* **Esprit Ammoniacale Anisé** consists of Oil of Anise 1, Alcohol 25, Solution of Ammonia 5. Several of the Foreign Pharmacopœias gave similar formulæ, *e.g.*, that of P. Dan. 1908.)

Glycyrrhizinum Ammoniatum U.S. *Dose.*—½ to 5 grains. Glycyrrhizin is contained in the root as the Ammonium Salt. Readily soluble garnet coloured, shining scales. It possesses a persistent sweet taste. The acid precipitated from it is bitter-sweet. A grain will flavour 6 ounces of water. It may, perhaps, be considered as the Ammonium Salt of Glycyrrhizinic Acid which, according to Tschirch, has the formula $C_{41}H_{61}O_3(COOH)_3$. *For further details on this and the Assay of Liquorice vide Vol. II.*

Liquorice preparations cover the taste of ammonium chloride, alkaline iodides, cascara, magnesium sulphate, quinine sulphate, ipecacuanha, and aloes, hence is in Mistura Sennæ Composita, Decoctum Aloes Compositum and Confectio Sennæ.

In addition to the extracts, dried 'Liquorice Juice,' or 'Spanish Liquorice,' is sold, that bearing the stamp of Solazzi being most prized. Pontefract Cakes of Liquorice and 'Pipe Liquorice,' are useful in allaying tickling coughs.

Trochisci Glycyrrhizæ, Brompton Hospital, and **City Road Chest Hospital,** commonly known as 'Brompton' Cough Lozenges, or 'Brompton Blacks,' contain Liquorice Extract 3 grains, Anise Oil ½ minim in each (Acacia basis). **Pastilles de Réglisse.**—Liquorice pastils, much used in France.

Pulvis Glycyrrhizæ Compositus. (*Off.*). *Syn.* PULVIS PECTORALIS (*Kurellœ*). Senna and Liquorice of each 2, Fennel 1, Sublimed Sulphur 1, White Sugar 6½. Mix.

Dose.—1 to 2 drachms (**4 to 8 Gm.**), mixed with water or milk, taken early in the morning, is a mild and agreeable laxative. For constipation and hepatic disease, it is pleasant to take, and effectual without catharsis. U.S. uses oil of fennel, which makes it less granular. It is also prepared *sine Saccharo* (Hewlett),—with *half* above dose, more palatable, and more suited for use where sugar is barred.

Poudre de Réglisse Composée. *Syn.* PULVIS LIQUIRITIÆ COMPOSITUS. FR. Cx. contains Liquorice 1½, Senna (washed with alcohol and powdered) 1½, Fennel 1, Sublimed Sulphur 1, White Sugar 5.

Species Pectorales, P.G.V. Coarsely cut Marshmallow Root 8, Liquorice Root 3, Orris Root 1, Tussilago Farfara (Coltsfoot) Leaves 4, Verbascum Flowers 2, Anise 2.

Manchurian Liquorice Root, *G. uralensis Fisch* or *G. pallidiflora Maxim.*: contains an average percentage of Glycyrrhizic Acid, and though giving an aqueous extract in accordance with B.P. requirements, is excluded in that it is unpeeled.—I. R. Fahmy, B.P. Conf. 1923. P.J. ii./23,113.

Gokhru.—The prickly fruit of *Pedalium Murex.* A remedy for nocturnal seminal emissions, incontinence of urine and impotence. Is rich in mucilage. Of an infusion 1 in 10 of boiling water (stand 2 hours) half a pint is a daily dose. Should be freshly made. **Liquid Extract** 1=1, made with Alcohol 90%. *Dose.*—20 to 60 minims. Burra Gookeroo is believed to be identical with *Pedalium Murex fruit.* It is used similarly in India, though by some it is identified as *Tribulus lanuginosus* (*Zygophyllaceœ*). **Guaycuru** (*Statice braziliensis*). Emmenagogue (?) Infusion, taken freely Astringent. For dysentery.—Ph. Notes, River Plate.

Guarana. U.S., P. HUNG. *Dose.*—10 to 60 grains in powder, or infused in a cup of boiling water The seeds of *Paullinia Cupana. P sorbilis* (*Sapin-*

daceæ), roasted and moistened with water, made into a hard paste, rolled into cylinders, and dried. Imported from Brazil. The drug contains 2·5 to 5% **Guaranine,** which is identical with caffeine, *q.v.*, together with tannin, gum, &c. Is recommended for sick-headache. A nervine tonic. *Dose.*—½ to 5 grains or more. U.S. IX· has standard 4% alkaloids. *Assay.*—By shaking with chloroform and ammonia. Methods of preparation of Guarana by the Guarani Indians.—P.J. ii./10,577.

Fluidextract U.S. *Average dose.*—½ drachm. Standardised to 4 Gm. (average) Alkaloids in 100 Cc. Prepared by percolation with Diluted Alcohol.

Tincture. *Dose.*—½ to 1 drachm. Macerate Guarana 1, in Alcohol 60% *q.s.* to produce 4.

Hæmatoxyli Lignum, Logwood. (*Off.*). The unfermented heart-wood of *Hæmatoxylon Campechianum* (*Leguminosæ*). Of sweetish astringent taste. The fermented chips used by dyers are deep red in colour, have lost the sweet taste and the hæmatoxylin is oxidised to *Hæmatein*, $C_{16}H_{12}O_6$.

Preparations of logwood, colour the fæces and urine red, and stain linen.

Incompatible with acids and lime water. Certain metallic salts (notably iron) produce blue colour; mercuric salts brown. The decoction is a remedy for diarrhœa and some forms of urinary hæmorrhage. **Liquid Extract, B.P.C.** 1 = 1. *Dose.*—½ to 2 drachms (2 to 8 Cc.). **Extract,** An aqueous extractive completely soluble in water. *Average dose.*—15 grains.

Decoctum Sappan 1 in 20 of **Sappan** Wood (*Cæsalpinia Sappan, Leguminosæ*) is *Off.* and is similar to Logwood.

Hæmatoxylin. $C_{16}H_{14}O_6 + 3H_2O = 356{\cdot}24$. Usually in yellowish granular crystals, slowly soluble in water, easily in alcohol. Alcoholic Solution 0·2% is used as indicator—yellow in acid and purple in alkaline solution. Also for staining in microscopy. *vide Vol. II.*

Harmine and **Harmaline.** Alkaloids contained in the seeds of *Peganum Harmala.* A strong smelling herbaceous plant *N. O. Rutaceae.* It is the wild Rue of Dioscorides. Further details last Edn. p. 799.

Harmaline has a toxic action on trypanosomes *in vitro* but no curative effect on the disease in rats. In 50% of the cases treated it caused disappearance of the parasites from the peripheral blood in acute malaria and fall of temperature. In the other 50% it failed to check the disease. It is thought inferior to quinine for acute malaria. Harmine failed to cut short acute attacks. In three cases of relapsing malaria it proved remarkably successful. Both alkaloids could with safety be given in larger doses than those employed with possibly better results.—Prof. J. A. Gunn, and Lt.-Col. D. G. Marshall, Proc. Roy. Soc. of Edinburgh, Vol. xl, Part ii (No. 15), 1920.

Trypanosomiasis treated by Harmala Alkaloids (Gunn)—not found curative. Review of tropical diseases.—R. T. Hewlett, Pr., April, 1921.

Hedera Helix (*Araliaceæ*), **Ivy**—juice of leaves has been used to ulcers. The berries are said to be purgative.

Hederin—a glucoside with Digitalis-like action, but is injurious to the heart and blood corpuscles.—B.M.J. i./12,61

Heliotropin, $C_6H_3O_2CH_2COH = 150{\cdot}088$. *Syn.* Piperonal, a Methylene derivative of Protocatechuic Aldehyde, when pure is in shining white flaky crystals with Coumarin odour, slightly soluble in water, freely in alcohol, much used in perfumery. Usually manufactured by oxidation of safrol with chromic acid.—P.J. ii./06,377.

Helonias dioica.—False Unicorn Root. Is used in colic and in atony of the generative organs; also employed as an abortifacient.

Hemidesmi Radix.—Dried root of *Hemidesmus Indicus* (*Asclepiadaceæ*). Indian Sarsaparilla. Was known as *Smilax aspera.* Antisyphilitic properties. Infusion 1 in 10. Employed in kidney affections.

Henna, *Lawsonia inermis* (*Lythraceæ*). The powdered leaf is employed as a hair dye, usually in conjunction with indigo, *e.g.*, the following:—Apply a paste of Henna 1, Indigo 2, for varying periods according to the shade required—one hour for light brown. 1½ hours for darker—should be tried experimentally before use. It is employed internally and locally in jaundice, leprosy, and skin affections.

For a recent account of History, Botany, Cultivation and Chemistry of Henna and Shampoo formula see E. M. Holmes P.J. i./24,437.

The constitution of Lawsone.—J.C.S.A. i./20,626.

Heracleum Giganteum, allied to Angelica. The acrid sap of, produces dermatitis.—B.M.J. ii./12,1139.

"Himalayan Oil" has been advocated for mental weakness, insomnia, neurasthenia, etc. It is for external application only. (See last Edn., p. 800.)

Holarrhena Antidysenterica (APOCYANACEÆ). *Syn.* according to some, Wrightia Antidysenterica, Bengali *Kurchi* or *Coorchi*, a small deciduous tree found throughout India. An infusion of the bark (and seeds) has remarkable effect in dysentery. The plant, as also *H. Congolensis* from the Congo contains **Conessine** $C_{12}H_{20}N$. This alkaloid has strong inhibitory action on amœbæ—equal to that of Emetine. It is 50% less toxic than the latter. Conessine salts can be given *per os.* and intravenously but subcutaneously it produces necrosis at site of injection. Suggested dose of Powdered Bark 2 to 5 grains. A liquid extract 1=1 was tried with good result.—I.D.C. 1916; H. C. Brown, B.M.J. i./22,963; F. L. Pyman, J.C.S.T., Feb. 1919, p. 163.

Holarrhena var. also contain the alkaloid **Holarrhenine**.

See also our page 528.

Hordenine. *p.*Oxy-phenyl-dimethyl-ethylamine $C_6H_4OHC_2H_4N(CH_3)_2$ Alkaloid obtained from barley in the process of malting. Leger, *Comptes Rend.* 142 (1906) 108; 143, 234, 916. *Dose* uncertain, but 1 Gm. doses have been given to a suckling child. Suggested in hyperchlorhydrosis, enteritis and diarrhœa.—Int. Cong., 1909, C.D. i./09,873.

The compound has been synthesised—see Barger, J.C.S. 95 (1908) 2193 also Rosenmund Ber. 43 (1910) 306, and P. May, p. 143. It will be seen the substance bears constitutional resemblance to Tyramine *q.v.*

Hydrangea (*Saxifragaceæ*). A decoction of the plant (*H. Arborescens*) is stated to have been used with advantage by the Cherokee Indians in calculus diseases.—U.S.D. **Elixir of Lithia** and **Hydrangea.** *Dose.*—1 to 2 drachms. A proprietary preparation stated to contain in an ounce Lithium Salicylate 12 grains, Lithium Benzoate 12 grains, Hydrangea root 240 grains. A diuretic and diaphoretic preparation for use in gout and rheumatism.

The Canadian Formulary 1910, has an **Elixir** (of different strength to this). Dissolve Lithium Salicylate 600 grains and Lithium Benzoate 300 grains in Aromatic Elixir 25 ounces,—add Alcohol 95% 7½ ounces to Fluid Extract of Hydrangea 7½ ounces and mix all together. *Dose.*—1 to 2 drachms well diluted with water between meals and at bedtime. (Liquid Extract of Hydrangea may be prepared 1 = 1 with 45% Alcohol).

Hydrocotyle asiatica, Ph. Ned. Water Pennywort. The umbelliferous herb is used in India for specific skin diseases, scaly eruptions, and ozæna as an alterative and diuretic, in 4 to 10 grain doses internally; is added to lard as an ointment, also to poultices, and used as snuff in ozæna. Contains 15% of a volatile aromatic oil named Vellarine.

Hydroxylamine, $NH_2OH=33{\cdot}032$, is formed by the action of nascent hydrogen on nitric acid. Its strong reducing properties suggested its use in tinea and psoriasis. It is a strong antiseptic. Does not stain the skin. The HYDROCHLORIDE, $NH_2OH.HCl=69{\cdot}50$, is in hygroscopic crystals, with an acid taste and reaction, freely soluble in water. Solution 1 in 1,000 of equal parts of glycerin and alcohol or ointment with adeps lanæ, successful in lupus, ringworm, and parasitic sycosis. The first few applications (by friction) do not produce smarting, but later ones may.—B.M.J. i./03,545.

Manufacture.—Hydroxylamine is prepared by passing Sulphur Dioxid (4 molecules) into a concentrated solution of Sodium Nitrite (2 molecules) and Sodium Carbonate (1 molecule) at −2° to −3° with constant stirring until just acid. The solution is warmed with a few drops of Sulphuric Acid and then kept at 90—95° for two days. Neutralise with Sodium Carbonate and evaporate until the solution weighs about 10½ to 11 times as much as the Sodium Nitrite originally taken. The Hydroxylamine Sulphate is obtained from the motherliquors and purified by recrystallisation.—Thorpe, Vol. III./8

Our experience with the method was that after passing in Sulphur Dioxid for 4 or 5 hours the liquid tended to turn brown—then decolorised and crystallised out. More water was added at this stage. The process gives satisfactory result but Hydroxylamine Hydrochloride is difficult to obtain crystalline.

It may also be manufactured by electrolysis of Nitric Acid. The process is conducted in a cathode cell using mercury or amalgamated copper electrode

The electrolyte is sulphuric acid of over 40% strength and the nitric acid is slowly dropped in, the whole being kept cool. The Hydroxylamine is recovered as sulphate.—P.J. i./16,3.

Hydroquinone. *Syns.* QUINOL, HYDROCHINON (German). *Dose.*—½ to 5 grains $C_6H_4(OH)_2$ 1 : 4 = 110·078 An isomeride of Resorcin $C_6H_4(OH)_2$ 1 : 3, and Pyrocatechin 1 : 2.

Manufacture.—Our experiments in making this suggest the following notes:—Mix Sulphuric Acid 24 lbs. with Water 1 gallon. Allow to cool completely (some hours), then mix Aniline 3 lbs. with Water 2 gallons and add the Sulphuric Acid mixture gradually. Allow to stand until the following day. Add Ice 28–56 lbs. and surround with ice 56 lbs. and salt sufficient to sprinkle the ice. Dissolve Sodium Bichromate commercial 15 lbs. by elutriation in water sufficient to make a saturated solution. Run in one third of this solution gradually and allow to stand two hours watching the temperature (not to exceed 10° C. throughout). Then add the remainder or sufficient quantity until the precipitate is a clear yellow and the mixture is no longer made a brighter yellow. Collect the precipitate; suspend in about a gallon of water; pass in SO_2 until the greenish black colour disappears and the liquor is saturated with the gas and extract with ether twice or three times (or better employ a non-inflammable solvent). Distil off the ether and recrystallise from water acidulated with Hydrochloric Acid, decolourising the solution with animal charcoal in presence of SO_2.

Electrolytical deposition is more economical than the chemical method. Theory of the reaction.—P.J. i./16,3.

Poisoning by Hydroquinone—20 grains recovered from dejecta.—A. Mitchell, & J. Webster, B.M.J. ii./19,465.

It is *Soluble* 1 in 20 of water, also in alcohol about 1 in 4. It possesses stronger antiseptic and antipyretic properties than Resorcin, also resembles carbolic acid. Is used as a photographic developer, *q.v.* Qualitative reactions of Pyrocatechin.—P.J. i./07,208,430.

Hysterionica. *Syn. Aplopappus Baylahuen* (*Compositæ*) *Remy.* From Chili. Recommended in malarial and chronic dysentery, flatulent dyspepsia and diarrhœa. **Liquid extract.** *Dose.*—5 to 15 minims.—N.S.D. p. 1394.

℗ **Ibogaine.** $C_{52}H_{66}N_6O_2 = 806·836$. An alkaloid obtained from the Iboga (*syn.* aboua, or obouete or liboka) (N.O. Acanthaceæ), *Tabernanthe Iboga*, Baill., a plant growing in West Africa, particularly the Congo. In certain districts it is rare and commands a high value. The blacks claim exciting and aphrodisiac properties for it. It has also strong sustaining powers. Too large a dose may produce tetanus and convulsions. The plant has been used with some success in sleeping-sickness. Ibogaine is extracted by making a mash of the powdered root with milk of lime, drying, extracting with ether, and subsequently treating that extractive with 10 per cent. sulphuric acid. The alkaloid and its salts taste somewhat like cocaine. The base is soluble 1 in 28 alcohol 95 per cent. at 15° C. Insoluble in water. Melting-point 151° C. Its solutions are lævorotatory. In solution the substance oxidises, but keeps well in crystalline form. As an anæsthetic ibogaine does not seem equal to cocaine or stovaine, but is a good stimulant of the central nervous system in small doses. It exercises a very strong action on nutrition, augmenting respiratory changes, and the processes of assimilation and rejection. It is a muscular tonic, notably a nerve tonic and a heart tonic.

℗ **Ibogaine Hydrochloride** $C_{52}H_{66}N_6O_2.HCl = 843·304$, occurs in white crystalline scales, soluble 1 in 50 water at 15° C., 1 in 1·5 alcohol 95 per cent. at 20° C. Solutions 1 in 50 will crystallise out in the winter. The alkaloid would appear to be valuable in all cases in which, following on an infectious disease, or owing to malnutrition, the patient suffers from nervous depression—in la grippe, angina, and heart affections generally. *Dose* of Ibogaine Hydrochloride 0·01 to 0·03 gram (⅙ to ½ grain) per diem. **Nyrdahl's Dragees** contain 0·005 Gm. (1/12 grain), with dose 2 to 6 *pro die.*

Ichthyocolla (P. Belg.) Isinglass. The swimming bladder of certain species of the sturgeon and hake; dried and sliced into thin pieces. About 3 drachms to the pint of warm water forms a jelly. Is used for refining wine. Added to milk to prevent formation of tough curds difficult of digestion. Isinglass Plasters on Muslin, 8 inches wide, yard rolls (also 11 inches by 5 yards). Also Tapes, ¼, ½ and 1 inch, 10 yard lengths. Also Isinglass on Silk, 7 inches wide, flesh-colored, black and white, are made. P. Jap. gives method of making Court Plaster.—"Emplastrum Adhæsivum Anglicum."

Sinclair's Glue.—Glue 50, water 50, glycerin 2, calcium chloride 2, thymol 1. For applying extension in fractures instead of plaster. Melt on water bath when required and apply with the hand using a bandage if necessary.

The following is more elastic:—Isinglass 50, glue 50, water 50, calcium chloride 2, tannin 12, glycerin 2, thymol 1.—B.M.J. ii./17,60.

The Thymol content is excessive. One-tenth of the amount in either of the above would be ample. 'Blistering' of the skin has occurred in its use which we attribute to the amount of Thymol.—W.H.M.

Inula Helenium (*Compositæ*).—Elecampane. Root contains Inulin allied to Starch, and Helenin. *Dose.*—¼ to 2 grains (**0·016** to **0·12 Gm.**) a stearoptene, in white acicular crystals, insoluble in water, but freely so in alcohol. Is antiseptic, used in ozœna, keeps off insects, and internally for phthisis, malarial fevers, infantile and catarrhal diarrhœa; checks bronchial secretion. **Inulin** from this and from Dahlias and Helianthus is the same. Inulin is stated to be present in Burdock root to the extent of 45%, Dahlias 20%.—Holmes.

Extractum Inulæ Liquidum. 1=1 *Dose.*—10 to 60 minims. **Extractum Helenii** (solid) is official in **Ph. Ned.**

Ipomœa batatus is the **Sweet Potato** which is used as a vegetable in many parts of the world—Persia, India, Japan, China, etc. A perennial plant, the tubers being dug and removed from the plant, which is left to grow until replanting is deemed necessary.—P.J. ii./11,417.

Ipomœa purpura. *Syn.* **I. congesta.** *Convolvulus purpureus, Pharbitis Hispida N.O. Convolvulaceæ.* (Common Morning Glory.) Stems and roots in S. Africa, under name i-jalapa, used by natives as purgative. Aerial stems contain 4·8% Resin, of which 15·5% was Ether soluble. This and the alcohol soluble portion of the crude resin was markedly purgative in Gm. doses given to a dog.

Iridin.—*Syn.* **Extractum Iridis.** *Dose.*—1 to 3 grains in a pill alone or with extract of henbane, or with one grain of Euonymin.

The dark brown powdered extract made with Alcohol 60% from the root of the blue flag, *Iris versicolor* (North America). Has a bitter, acrid taste, possesses cathartic, alterative, and diuretic properties, given in hepatic and intestinal disorders.

Iris Florentina, I. Germanica, &c. (Italy). Yield **Orris Root** of perfumery, containing **'Butter of Orris'** about 0·15%, a sweet-scented fatty substance *Tinctura Iridis* is prepared from the root in 8 Alcohol 90%.

Sneezing treatment for prevention of adenoids satisfactory. Powdered Orris Root and soap used to lightly touch the nasal septum. It is not sniffed up the nose.—L. ii./18,240.

Ispaghula, *Off. Dose.*—45 to 150 grains. Pinkish brown boat-shaped seeds of *Plantago ovata.* (*Plantaginaceæ*). Much valued as demulcent = Linseed or Barley.—Decoctum, *Off. Dose.*—½ to 2 ounce. 1·5% in Water.

Ixora Coccinea. *Syn.* FLAME TREE. *Dose* of the powdered drug.—30 to 45 grains (**2 to 3 Gm.**) with aromatics, every three or four hours. Taste not disagreeable. A branching shrub growing throughout Bengal, Southern and Western India, N.O. *Rubiaceæ.* The root contains Tannin, Saccharine matter, a large amount of fixed and small quantity of volatile oil; no alkaloid. Found to be an intestinal antiseptic with cholagogue property both of which are associated with an alterative effect on the intestines. In dysentery and sprue, but it is not a panacea.—I.D.C. 1916. **Tincture.** *Dose.*—1 to 1½ drachms in water twice or thrice daily as tolerated, increased if necessary. 1 in 5 alcohol 60%.

Mistura. *Dose.*—One ounce thrice daily as tolerated, increased if necessary. Tincture of Ixora 1 ounce, Peppermint Water to 8 ounces.

Jalapa. *Syn.* BRYONE OR MECHOACAN NOIR. *Dose.*—5 to 20 grains. The dried tubercules of *Ipomœa Purga* (*Off.*), *U.S. Exogonium Purga* (*Convolvulaceæ*). A powerful purgative producing watery stools, is apt to gripe; must be avoided if the bowels are inflamed. Used to reduce dropsy of Bright's disease, and to relieve uræmia. The **Extract** (*Dose.*—2 to 8 grains), **Resin** and **Tincture** are mostly used. **Tinctura Jalapæ Composita.** (*Off.*), *Dose.*—½ to 1 drachm. Contains 8% Jalap with Scammony Resin and Turpeth.

Jalapæ Resin, P.G.V. and **U.S.** *Dose.*—2 to 5 grains. Contains two glucosidal resins, about 90% Convolvulin (*Syn.* JALAPURGIN), $C_{31}H_{50}O_{16}$ =678·555, soluble in alcohol but insoluble in ether [this should be termed JALAPIN, as understood in England (*dose* 1 to 5 grains)], together with about 10% Jalapin (Mayer), (*Syn.* ORIZABIN), $C_{34}H_{56}O_{16}$=720·618, soluble in ether

and in alcohol. The latter, the principal constituent of spurious Jalap (*Ipomœa simulans* and *I. orizabensis*), is identical with **Scammonin** (*dose*, 1 to 5 grains) from scammony root, *Convulvulus Scammonia* (*Convolvulaceæ*). It is cheaper and less active. The average yield of resin is about 10%. FR. CX. requires 7%. *Off.* requires to contain not more than 15% ether-soluble. *For further data on Jalap and Scammony Resin, see Vol. II.*

Pulvis Jalapæ Compositus (*Off.*). *Dose.*—10 to 60 grains. Contains 30% Jalap with Ginger and Acid Potassium Tartrate.

Juglandin.—An extractive prepared from the inner bark of the root of *Juglans cinerea*, the North American butter-nut; is an hepatic stimulant and cathartic. *Dose.*—2 to 5 grains in pill. **Spiritus Nucis Juglandis,** distilled from *Juglans regia*, the common European walnut, is an antispasmodic and for checking sickness of pregnancy. *Dose.*—1 to 4 drachms. **Folia Juglandis** are in P. Austr.; also in P. Belg. (and Fluid Extract) and P. Helv. **Walnut hair dye.** Bruise green Walnut shells 16 ounces, with Alum 2 ounces, in a mortar, add Rose Water 4 ounces, macerate 4 days, strain and press. To every 3 ounces of expressed liquid add 1 ounce Eau de Cologne or other alcoholic perfume.—B.M.J. ii./08,124. For some reason Walnut Juice preserved in this way does *not* stain satisfactorily. Possibly the addition of the mordant is a mistake. It might be better to add it separately at time of use. We propose to experiment on the subject.

Juniperi Oleum. Oil distilled from fruit of *Juniperus Communis* (*Coniferæ*) and 'rectified.'—*Off.* Sp. Gr. 0·862 to 0·890, increasing with age. Soluble (when freshly distilled) 1 in 4 of 95% alcohol, becoming less soluble with age. We found a sample 4 years old was not clearly soluble in any reasonable proportion. The following test would condemn the majority of samples adulterated with Turpentine. "If 50 c.c. be distilled from a three-bulb Wurtz flask, the lowest of which holds 100 c.c., not more than 75% should distil below 180° C.; the residue in the flask should have a specific gravity not below 0·892 and a refractive index not below 1·4950."—Parry. **Spiritus** *Off.*, 1 in 10. U.S. 1 in 20. *Dose.*—5 to 20 minims. **Spiritus Juniperi Compositus** U.S. *Average dose.*—2½ drachms. Oil of Juniper 8, Oil of Caraway 1, Oil of Fennel 1, Alcohol (U.S.) 1,400, Water to 2,000. Terpeneless and Sesquiterpeneless Juniper Oil is stable and soluble in comparatively weak alcohol. **Vinum Diureticum,** P. Helv. *Dose.*—¼ to 1 ounce. Juniper 15, Squill 10, Orange Peel 10, Absinthe 5, Angelica 5, Sweet Flag 5, Dry Southern Wine 1,000.

Juniper Oil Standards—The Oil in commerce is a by-product. The specific gravity rapidly rises on keeping, *e.g.*, from 0·865 in Feb. to 0·873 in Dec., 1913; and the solubility diminishes. The relative therapeutic value of the Terpene and Sesquiterpene constituents is under investigation. If the Terpene bodies be those with the therapeutic properties there is very little reason for the use of Juniper Oil in preference to Turpentine.—P.R., Dec., 1913,402.

Oleum Juniperi Ligni. A trade name for Fictitious Juniper Oil supposed to be made from the wood but is generally a mixture of Juniper Berry Oil and Turpentine. *cf.* also Juniper Tar Oil.

Kaladana (*Off.*) *Syn.* PHARBITIS SEEDS. *Dose.*—30 to 45 grains. Dried seeds of *Ipomœa hederacea* (*Convolvulaceæ*). Purgative and Anthelmintic = Jalap.—Give dose 60 to 120 grains.—I.D.C.

Pulvis Kaladanæ Compositus, *Off.* *Dose.*—10 to 60 grains. Kaladana 30% Equivalent to Pulvis Jalapæ Compositus.

Tinctura, *Off.* *Dose.*—½ to 1 drachm. 1 in 5 of Alcohol 70%. **Kaladanæ Resina.** *Dose.*—2 to 8 grains is also *Off.* Useful hydrogogue.—I.D.C.

Kala signifies *black* and *dana* means seed. Other seeds are collected and shipped in place of genuine. Chemical and Histological Research on the seeds and resin.—H. C. Kassner, P.J. i./24,155.

Kauri Gum. A resin obtained from *Dammara Australis* in Australia and New Zealand. **Dental Compo.** Contains Kauri Gum. This is used for taking impressions of the mouth and teeth for plate preparation. *Directions.*—Place the cake of Compo in moderately warm water for about two minutes or so to soften—do not employ boiling water. The Compo should be kneaded with the wet fingers until it has hardened somewhat; by this proceeding it becomes almost cool. The Tray should be warmed for a short time before placing the Compo into it. The surface of the Compo is then smoothened with the hand, a little vaseline is rubbed on the surface, and the tray is held

for a second or two over a Bunsen flame. It is very important that the surface of the Compo should be heated in this way before inserting into the mouth. After inserting wait for 2 or 3 minutes. On removal, place the tray bearing the impression in cold water.

Kauri 'Gum.' Its collection and commerce.—Jas. B. Aitken, P.J. i./15,550.

Kava-Kava, *Syn.* **Awa Root,** *Off.* was I.C. Add,—*Piper methysticum* (*Piperaceæ*) from the Polynesian Islands. Is used by natives as a sialogogue and to make a fermented drink *v. infra.* Contains an essential oil, two resins and about 1% of a neutral crystalline principle, Kavahin or Methysticin, $C_{16}H_{18}O_5$=290·224, allied to Piperin and Yangonine, melting at 156°, $C_{10}H_3O_3$=176·114. Is a bitter tonic, nerve stimulant and diruetic. Has been used for gonorrhœa, gout, and cystitis, but efficacy against gonococcus is doubted. Extract, hydro-alcoholic. *Dose.*—5 to 10 grains. **Liquid Extract,** *Off.* 1 in 1 of alcohols 90 and 45%. *Dose.*—30 to 60 minims. The exhaustion with weak alcohol after percolating with strong alcohol is wrong as the extract on evaporating the weaker alcoholic percolate is insoluble in the reserved percolate.—H. Deane, P.J. i./15,622. Pill = 3 grains extract. *Dose.*—1 to 3 or 4. Infusion, 1 in 320. *Dose.*—½ pint. Though more palatable than, is not equal to copaiba or santal oil. Is a local anæsthetic to tongue and eye.

The intoxication produced by the drink in question, is wholly unlike that of alcohol, being of a silent or drowsy character accompanied by incoherent dreams.—U.S.D.

Kino (*Off.* and B.P. '98). U.S. *Dose.*—5 to 20 grains. The dried juice from trunk of *Pterocarpus Marsupium* (*Leguminosæ*), *Off.*—Now specified as to commercial varieties. Partly soluble in water, almost entirely in alcohol 90% nearly insoluble in ether. Astringent for diarrhœa, and as **Trochisci** for relaxed condition of the throat. Its powder is also insufflated to check epistaxis. **Tincture** (*Off.* and B.P '98). 1 in 10 of a mixture of Glycerin Alcohol, and Water. U.S. 1 in 20 with Glycerin 3 in 20. *Dose.*—30 to 60 minims. This gelatinises, due to an enzyme in the drug. Instead add Kino 2 to Boiling Water 10. and keep at 100° C. 12 hours. After cooling add Alcohol 10 and set aside 12 hours. Kino is a cheap source of Tannin.—P.J. ii./03.702. ***Incompatible*** with mineral acids and alkalis and with substances precipitable by the tannin it contains.

Butea Gum.—Bengal Kino may be used to replace in certain parts of the Empire.

Koromiko—These herbs, *Veronica salicifolia* and *V. parviflora*, imported from New Zealand, are used there and in China as a remedy for chronic dysentery and diarrhœa. Tincture, 1 in 5 of proof spirit. *Dose.*—½ to 1 drachm *V. elliptica* (Forst). Another New Zealand species used; a cultivated plant in certain parts has caused poisoning.

Krameriæ Radix. Rhatany Root (*Off.*). The dried root of *Krameria argentea* (Para) and *K. triandra* (Peruvian). Both contain about 8% of a tannin. Astringent in relaxed throat, also in tooth powders when gums are liable to bleed, and in mouth washes, also for bleeding from nose and bowels, and for diarrhœa. **Fluid-extract U.S.** VIII. *Average dose.*—15 minims. Strength 1=1 by diluted alcohol. Of deep red colour and astringent taste. **Tincture** (*Off.*). 1 in 5 of 60% alcohol by percolation. *Dose.*—30 to 60 minims. Should yield 5% extractive. ***Flavoring.***—Glyl Menthæ Viridis vel Piperitæ, Glyl Pini; Glycerin, Syrupus Aurantii. **Trochisci** are made with the Extract as also ℞ ℙ with Cocaine Hydrochloride $\frac{1}{20}$ grain.

Kukui Oil. *Syn.* Candle Nut Oil from New Zealand, Fiji, Hawaii, etc. obtained from the seeds of *Aleurites Triloba. Syn. A. Moluccana* (in Index Kewensis)—in amount equal to 60·8 per cent. of the decorticated nuts or 19·8 per cent. of the unshelled seeds. Sp. Gr. 0·920—0·9274, S.V. 184—204·2, I.V. 114·2—163·7. It belongs to the class of drying Oils. Medicinally it has cathartic properties. Suitable for soap, varnish making and other uses. Dries more quickly than linseed oil.—B.C.D., Apl. 18, 1913, p. 848.

Labdanum. *Syn.* **Ladanum** the exudate from *Cistus var.* was employed in the war by the Greeks for wounds.—Sir Charles Ballance, L. i./20,5.

Lachnanthes Tinctoria.—Spirit Weed, Red Root. A tincture=1 in 10 of proof spirit of this United States plant: is used to check the cough in phthisis. *Dose.*—1 to 10 minims. References to Alabone's treatment by Lachnanthes: last Edn. p. 805.

Lactose. — Saccharum Lactis, $C_{12}H_{22}O_{11},H_2O$ = 360·252. Milk Sugar *Dose, ad lib.* Used for weakly children. Is said to be a useful addition to Magnesia as a laxative, it increases the solubility of the latter by combination. It is prepared from the whey of milk.

Milk Sugar.—Preparation on commercial scale.—Y.B.P., 1913,139.

The organisms capable of fermenting Lactose are less frequently present in normal mouths than those in which dental caries exists. In the latter the Lactose fermenters are invariably present—a point which must have some bearing on the etiology of dental caries.—Sir Kenneth W. Goadby, International Medical Congress at Budapest. Annus Medicus, L. ii./09,1896.

Diabetics assimilate it in some cases with limited improvement. Aids assimilation of other carbohydrates.—B.M.J.E. ii./15,18.

Mucic Acid. $C_6H_{10}O_8$=210·11. Heat in a large vessel Lactose 1 and Nitric Acid (sp, gr. 1·3) 3 (by weight) for 20 minutes. On cooling the acid crystallises out as a white powder. Wash with a little water. It melts at 213° C. to 214° C. and is soluble 1 in 300 of water. Thorpe directs Lactose 100 Gm., Nitric Acid sp. gr. 1·15, 1200 Cc. heated on water bath till volume reduced to 200 Cc. diluted with equal volume of water and allowed to crystallise.

Laminaria Digitata, 'Sea Tangle.' From this seaweed **'Laminaria Tents'** are made for gynæcological and surgical use. Placed in contact with moisture these swell to three times their original size in dry state. The Laminaria is sterilised by drying after immersion in acetone, chloroform or alcohol 90% under pressure at 133° C., or by placing in Saturated Solution of Iodoform in Ether or in Sublimate Solution.

Lappa, Burdock. Roots of *Arctium Lappa*, Linné, or other species of Arctium. On the Continent called Bardana, *e.g.*, *Inf. Bardanæ Spirituos* (external): Bardana 2, water (boiling) *q.s.* to 15, strong alcohol 5, to be rubbed into the scalp. Ph. Notes. Denmark. LIQUID EXTRACT, 1=1 by Diluted Alcohol. *Average dose.*—30 minims. In skin affections and gout.

Lasiosiphon (*Lasiosiphon Meisneri*). *Dose.*—2 to 5 grains.

The root of this South African drug resembles Mezereon in its properties (there are several species—this is considered the most active). The bark of the root when chewed produces a scorching sensation, due to acrid resin, in about fifteen minutes.

Tincture of the root 1 in 10 Alcohol 90%. *Dose.*—10 to 60 minims. Found efficacious in chronic skin affections.

Liquid Extract. 1 = 1. *Dose.*—2 to 5 minims. **Lasiosiphon Bassorin Paste,** consisting of the Liquid Extract thickened with 3% Tragacanth; may be of service for local use.

Lathyrus Sativus.—A poisonous horse pea.—P.J. i./13,795.

Lauri Fructus.—*Laurus nobilis* (*Lauraceæ*). The ripe fruit, Laurel or Bay Berries, contains fixed 30% and volatile oil 1%. In rheumatic and similar pains.

Leptandrin.—*Dose.*—¼ to 2 grains. A resinoid powder obtained from Culvers Root, *Leptandra* (*Veronica*) *Virginica* (*Scrophulariaceæ*). Supposed to promote the flow of bile without irritating the bowels; useful in dyspepsia. Acts well with podophyllin. **Liquid Extract.** 1=1 of Leptandra by diluted alcohol. *Average dose.*—15 minims. Solid Extract (Powder form, 1=4) of drug by concentrating same and adding Glycyrrhiza. *Average dose.*—4 grains.

Levisticum officinale.—P.G.V. Lovage. A decoction in milk (a fresh leaf and stalk to a quart), allowed to simmer 2 hours. *Dose.*—3 to 5 ounces. For renal dropsy.

Limonene.—*Dose.*—10 to 20 minims (on sugar or in water).

This Terpene exists in several modifications, the *dextrorotatory* ($[a]_D$ = +106·8°) is contained in Lemon, Bergamot, etc., Oils, the *lævo* ($[a]_D$ = −105°) is in Pine Needle Oil and Peppermint Oils. *Inactive* Limonene (=Dipentene—*i.e.* + and —Limonene in equal amounts) is contained in Oil of Camphor, Swedish and Russian Terpentine Oil, etc. They do not differ greatly in taste and odour.

Limonene has been used in place of Turpentine Oil both by inhalation and internally. Stated to be of value in pulmonary disease associated with copious expectoration, *e.g.*, purulent bronchitis, bronchiectasis, gangrene and phthisical cavities. As a deodorant of foul smelling expectoration it is said to act well. Sputum decreases in amount. The substance is also valuable as a stomachic and externally in stimulating liniments.

Lemon Syrup. St. G. H. makes Lemon Syrup thus: Lemon Oil 1 minim, Alcohol 90% 20 minims, Syrup to ½ ounce. Garsed suggests to dissolve Citric Acid 2, in Lemon Tincture 5, strain if necessary, and add Syrup 50.

Tinctura Limonis.—We have found the following formula of P. Boa equal in flavour to the *Off.* formula. He uses Fresh Lemon Peel, cut small, 25, alcohol (90%) 52 and distilled water 48 mixed. Prepare by maceration. This is, therefore, weaker in spirit than the *Off.* For Syrup of lemon.—Citric acid 4 ozs., sugar 5½ lbs., distilled water 42 ozs. or *q.s.* tincture of lemon as above 5 ozs. Heat the water to boiling, add first the sugar, then the citric acid, and stir till dissolved. When cold add the tincture of lemon, and mix by shaking. Finally, add distilled water *q.s* to make to 100 ozs. This Syrup we find as good as if not better than the *Off.* Syrup. The taste is sharper—it is somewhat stronger in Acid, we found by titration about 25% stronger.—P.J. i./09,294. *For Oleum Limonis vide Vol. II.*

Linum.—Seeds of *Linum usitatissimum* (*Linaceæ*). Decoction, 1 in 20 demulcent or crushed for use as a poultice. Contains **Oleum Lini,** 30 to 40%, Sp. Gr. 0·930 to 0·940 (*Off.*) I.V. not less than 170. Used as enema, and with lime-water as Carron Oil. *q.v.* **Flax Seed** or Linseed (*Grains de Lin* in France) in habitual constipation. One teaspoonful to be taken floating in a tumbler of water before breakfast. Appears to act better than Agar Agar.—B.M.J.E. i./14,59. Tung Oil from *Aleurites Fordii*, irritant and poisonous, is a substitute for Linseed Oil.—Lewkowitsch gives particulars.

Liquores Concentrati. Introduced into the B.P. ('98) to replace commercial concentrated decoctions and infusions. One with 9 of water gave the corresponding infusions and decoctions. Commercially the strength is 1 to 7. See Index.

Lobelia (*Off.*) U.S., P. Belg. Dried flowering herb *Lobelia inflata* (*Lobeliaceæ*). Is purgative and emetic, but its only use is to relax spasm of the bronchi in asthma and bronchitis. Contained in many anti-asthmatic powders (*vide* Pulvis Lobeliæ Composita). Ⓟ**Fluidextract,** U.S., 1=1. An Acetic extractive. *Average dose.*—8 minims (**0·5 Cc**). Ⓟ**Tincture,** U.S., 1 in 10 alcohol (94·9% vol.). *Average dose.*—Expectorant 15 minims, Emetic 1 drachm. F.I. agreed 1 in 10 Alcohol 70%. Fr. Cx., Max. single dose 30 minims approx., max. during 24 hours 95 minims approx. Ⓟ**Tinctura Lobeliæ Ætherea.** (*Off.* and B.P. '98). 1 in 5 of Spirit of Ether. *Dose.*—5 to 15 minims until nausea occurs. In atonic constipation with dryness of the fæces, the tincture in 10 minim doses combined with cascara useful.—H. Standardisation by its effect on blood pressure and subsequent paralytic action on certain nerve cells is possible.—Dixon, P.J. ii./05,157.

Lonicera Periclymenum—Common honeysuckle and *L. xylosteum* (flag honeysuckle).—(*Caprifoliacæ*) Flowers or berries are poisonous.—L.i./09,932.

Lupulinum. (B.P. 1898). *Dose.*—2 to 5 grains in pill. Yellow powder—lupulinic-glands—separated from the strobiles of the hop—*Humulus Lupulus* (*Moraceæ*). Aromatic and bitter, and contains the properties of the hop—the resin and volatile oil.—Naylor. In insomnia and for alcoholism. Inhalation 30 grains to a pint of warm water. In gastro-intestinal diseases—enteric and dysentery.—B.M.J.E. ii./06,60. Should be fresh. 5 to 15 grain doses. Stimulates the general and local circulation, and improves the tone of the alimentary tract by its digestive properties.—**Tincture** (P.B. 1898). *Dose.*—½ to 1 drachm. Dried strobiles 1 in 5 alcohol (60%). More aromatic is made from fresh hops. Extractive varies greatly—standard of 4% was suggested. **Smoking** the dried strobiles has a somniferous effect.

Liquid Extract. *Dose.*—5 to 15 minims. An alcoholic extract, 1=1. **Solid Extract** by concentration. *Dose.*—2 to 6 grains.

Kent Hops contained 2·4% Tannin and 7·9% Ash, Choline, traces of a volatile alkaloid, *l*-Asparagine, Essential Oil and Resinous matter 14%, Potassium Nitrate and Sugar.—P.J. i./13,845.

Lycoperdon giganteum.—Puff Ball. Forms a soft and comfortable surgical dressing. The dusty powder is a powerful hæmostatic.—Whitla.

This and other fungi as styptics. History of and recent use. Heating in an oven to render aseptic does not reduce its hæmostatic power. Troublesome bleeding after tooth extraction can be stopped with it. It is not poisonous.—B.M.J. i./13,437.

Lycopodium. The yellow spores of the **Clubmoss** *Lycopodium clavatum* (*Lycopodiaceæ*), a fine powder. As a pill powder, also as a diluent for insufflations for the throat and ear, and as a dusting powder. When ignited it explodes with a flicker. **Tincture.** *Dose.*—15 minims to 1 drachm. Lycopo-

dium first soaked in ether and dried 1, Alcohol (90%) 10. To stop frequent micturition, and irritation of the bladder. In our knowledge a case has received great benefit after Salol, Helmitol, Bismuth, etc., had been found useless. Lycopodium Spores, microscopy of.—Nature, Mar, 31/10, p. 126. Use of in quantitative microscopy.—T. E. Wallis, B.P. Conf., 1919. Collection of Lycopodium in Poland.—P.J. i./23,64.

Maidis Stigmata.—*Syn.* Corn Silk. The thread-like stigmata of nearly ripe maize fruit. Are demulcent and diuretic. Used in cystitis, and nocturnal incontinence of urine. Liquid extract, *dose*, 1 drachm. Infuse corn silk 1,000 twice with water *q.s.* to cover. Evaporate liquor to 400. Cover and add cold water 300, allow to deposit, filter and evaporate to soft extract. Of this 1, with water 10, gives a clear solution. A *Syrup* may be made of Liquid Extract 1, Simple Syrup to 10. On Foods cultivated by the natives in Portuguese West Africa. An interesting summary divided according to their natural orders—Maize is the principal one.—Jl. Trop. Med. May 1, 1907. [℗] **Maidis Ustilago.**—Maize Ergot, Corn Ergot. Is used in parturition in place of ergot. *Dose.*—15 to 60 grains. [℗] **Fluid Extract,** ½ to 2 drachms.

Manaca.—A portion of the Brazilian root *Brunfelsia hopeana Benth.* (*Solanaceæ*) which has been used in rheumatic affections. Experiments have shewn it to act on the glands, especially the kidneys. **Liquid Extract** 1=1. *Dose.*—10 to 30 minims thrice daily.—N.S.D. It is frequently combined with Salicylates as in the following—a proprietary preparation. **Elixir Manaca** and **Salicylates**; each ounce equals Manaca 80 grains. Sodium Salicylate 64 grains, Potassium Salicylate 32 grains, Lithium Salicylate 8 grains. *Dose.*—1 to 2 drachms.

Mandragora. Mandrake. *M. Autumnalis* (*Solanaceæ*).

The root is often forked and is sometimes similar to the human body in shape. It is poisonous with effects allied to belladonna. Contains an alkaloid.

Mandrake soaked in Port keeps a 70 year old Russian youthful.—B.M.J. ii./19,762. 'X' tried the Port without the Mandrake. Although 30 he looked like 70 the next morning.—*ibid.*, 802.

Manna, U.S. *Average dose.*—½ ounce. Saccharine exudation from *Fraxinus Ornus*, Linné (*Oleaceæ*), and other species. In flattish, somewhat three-edged pieces. Soluble with some residue about 1 in 3: slightly in Alcohol 90%. Contains Mannitol (*syn.* Mannite, P. Ital.), (a non-fermentable sugar which does not reduce Fehling's Solution), $C_6H_8(OH)_6 = 182.142$, to extent of 74% and Dextrin about 20%. Has mild laxative properties.

Maranta *Syn.* **Arrowroot Starch,** from *M. arundinacea* (*N.O. Marantaceæ*) is in some slight demand as an article of diet. 1 tablespoonful to the pint of hot water produces a demulcent mucilage. Florida Arrowroot from Zamia Floridana, A. De C. *N.O. Cycadaceæ.*—T. E. Wallis, C.D. 1923, p. 378.

Marrubium.—Horehound. Dried leaves and flowering tops of *Marrubium Vulgare*, Linné (*Labiatæ*). *Average dose.*—30 grains. Given in lung affections—has tonic properties. Infusion 1 in 20 of boiling water.

Mastich (P. Belg.), yellow brittle resinous tears obtained from *Pistacia lentiscus* (*Anacardiaceæ*): insoluble in water, but partly in Alcohol 90%; also soluble in Ether 2 in 1 and in Chloroform 2 in 1, also readily in Acetone. **Alcohol Mastichi,** R.D.H.—Mastich 2, Alcohol 90% 1; dissolve. Harvard Liquid is similar; this is employed for covering a cottonwood dressing so as to form a temporary dental covering, *e.g.*, during the treatment of canals with an antiseptic such as Formosyl. **Æther Copal** is R.D.H. (Copal Solution).—Copal 1, Ether 1, dissolve. For covering cement fillings to protect from the saliva. Zanzibar Copal is a fossilised resinous body obtained from *Trachylobium Hornoman nianum* (*Leguminosæ*); *Vateria indica* (*Dipterocarpeæ*), Indian; the Brazilian is from *Hymenæa* species and other plants. Australian Copal is Gum Kauri, *q.v.*

Microscopic Varnish. Mastich ½ ounce, Caoutchouc 15 grains, Chloroform 2 ounces; macerate and filter. Mastix is official in P. Belg.

Ph. Form. supplies an account of the use of this and other Resins in the manufacture of varnishes, polishes, lacquers, stains, etc.

Constituents of Loango, Sierra Leone and Benin Copals.—P.J. ii./10,41,729.

Benzo Mastiche. *Syn.* ✱**Mastisol.** (T.M. 336855).—A solution of Mastich in Benzol (with other ingredients) for wounds, for general surgical use, on the battle-field and in major and other operations, etc.—B.M.J. ii./12,976.

It is stated to act as a harmless disinfectant by arresting the micro-organisms on the skin, etc., where applied—virtually entangling them. Its action is rapid and quite painless, excepting for a temporary burning sensation when first applied. There is no danger of eczema which has resulted with use of Iodine. The asepsis produced is absolute. ***Method of use.***—In wound treatment the temporary first aid bandage, if any is removed and even if blood-smeared, is painted straight away with a sufficient covering of the preparation, and then a dressing applied. Slight injuries may have a layer of sterile gauze first to draw off the wound secretion. Previous washing, disinfecting with soap, Alcohol, etc., is not required. Useful in burns and corrosions of the 2nd and 3rd degree, the whole area being painted over and covered with cotton wool.

A solution of Mastich 20 in Linseed Oil 1 and Chloroform 50 for treatment of operation wounds has been used.

Heusner's Glue. Resin (commercial) 50, Venice Turpentine 5, Methylated Spirit 50, Benzene 25. For applying extension in fractures. Also useful substitute for Mastisol.—C. Max Page, B.M.J. ii./17,290.

The following have also been suggested:—

(1) Dammar 250, Castor Oil or Linseed Oil 30, Benzol 700, Sodium Bicarbonate 50, Amyl Acetate a few drops. Set aside for several days with shaking and strain.

(2) Colophony Resin 300, Venice Turpentine 20, Castor or Linseed Oil 10, Benzol 700, Sodium Bicarbonate 60, Amyl Acetate a few drops.—K. Dieterich, P.J. i./15,100. See also B.M.J. i./25,441, and Mencière's Solutions.

Pistachia Lentiscus Oil (Mastich Leaf Oil) contains Pinene and probably other Terpenes. Has an odour resembling Rue and Savin Oils —Perfumery Record, Dec., 1913.

Melaleuca Viridiflora (*Myrtaceæ*).—Indigenous to New Caledonia.

***Gomenol** (T.M. 215925), aFrench proprietary, is stated to be a distilled essence of; given in rhinitis, laryngitis, and other diseases of the respiratory system. **Pates Pectorales au Gomenol** are also made. In influenza, bronchitis, and coryza and with Vaseline Oil as Ear Drops.—Ph. Notes.

Melissa Officinalis (*Labiatae* 'Balm' was official in U.S., 1890, Eau de Melisse des Carmes. *Syn.* Alcoolat de Mélisse composé,Fr. Cx. German *Carmeliter Geist.* Spiritus Melissæ Compositus; digestive; twenty to twenty-five drops twice a day, is also used as an application in rheumatism, etc. Eau de Carmes was first sold by the bare-footed Carmelites, the monks of the New Reform, as they called themselves, who found a home in Paris in 1605—the elixir was introduced in 1611.

Mediæval occultists made an Elixir Vitæ of this called Ens Melissæ.

Mentha Piperita (*Labiatæ*) **Peppermint.**

Oleum Menthæ Piperitæ is distilled from the fresh flowering plant rectified if necessary. Sp. Gr., 0·900 to 0·920. Soluble 1 in 4 of 70% alcohol. Should contain at least 50% menthol, free and combined, and not less than 5% of esters (calculated as menthyl acetate) *Off.* A sample of English Oil we examined 1914 had Sp. Gr. 0·908, and the *Off.* solubility in alcohol. Further dilution produces turbidity. **Spiritus** (*Off.*) 1 in 10 alcohol 90%.

In coryza the use of this oil instead of menthol is advised. Warm a few drops and inhale. This effected a clear passage in nostrils where same were occluded by swelling of the mucous membrane. It removes concurrent headache from pressure in the frontal sinuses. In the early stages of colds with congested mucous membrane and watery discharge it is most successful. The point is to continue treatment after the nose has become clear and not to allow the passage for air to become obstructed again for some hours.

Menthæ Viridis Oleum, is distilled from fresh flowering Spearmint.

Forms a clear solution with an equal vol. of 85% alcohol, the solution becoming turbid on further dilution. (The turbidity is noticeable with a double volume of alcohol.—W.H.M.) Soluble 1 in 3 of 90% alcohol.—*Off.*

Menyanthes trifoliata. *Syn* Trifolia Fibrina, P.G.—Bogbean Leaves or Buckbean. Are bitter tonic, emmenagogue, antiscorbutic, vermifuge and febrifuge; large doses are purgative and emetic; contain Menyanthin, $C_{30}H_{46}O_4$ = 630·518, a glucoside. Infusion 1 in 20. *Dose.*—2 to 6 ounces, taken hot, early in the morning daily, useful for functional amenorrhœa. Liquid Extract with Liquorice, 1 in 2. *Dose.*—½ ounce. The leaves are in P. Dan.

Methyl Chloridum CH_3Cl = 50·489. This gas made by distillation of Methyl Alcohol, Sodium Chloride, and Sulphuric Acid is supplied

compressed in cylinders. As local anæsthetic it is valuable in neuralgia, sciatica, rheumatism. Spray the part for 5 or 6 seconds only.—If effect too strong, apply Glycerin.

Beet Molasses contain 10% of nitrogenous matter and on distillation with Lime yield Methyl Alcohol and Trimethylamine. The latter on treating with Hydrochloric Acid under pressure at 350° C. yields Methyl Chloride which is used in dye manufacture and for refrigerating.—Martin's Industrial Chemistry, Organic, 1912,376.

Methylene Chloride. $CH_2Cl_2 = 84{\cdot}941$, used as anæsthetic in Germany under the name of 'Solaesthin.' Unsuitable for complete narcosis, but may be used to relieve the pains of labour by a process of intermittent administration.—Pres., Sept. '23,319.

Mezereum U.S. *Average dose.*—7½ grains. Dried bark of *Daphne Mezereum* (*Thymelaceæ*) and other species. Fluidextract, U.S., is 1=1 Hydroalcoholic. Contains a crystallisable substance (Daphnetin), which is isomeric with Æsculin (*q.v.*). Has been used as an epispastic for many years past, and stimulant.

Mollinum. *Syn.* **Salve Soap - Unna.** Prepared by boiling Lard 400 with Caustic Potash 56 in Water 400 and Alcohol 90% 40. Allow to stand 12 hours at 50—60° C., then add Glycerin 150. A white soap, containing about 12% excess of fat. As a basis for ointments for rapid absorption. It is readily washed off with water, with which it forms a lather. It leaves the skin fresh and supple, and makes no grease spots on linen. **Mollinum Hydrargyri** and **Mollinum Potassii Iodidi** contain 33% and 10% respectively of mercury and potassium iodide. Not incompatible with mercuric chloride. Is used with respectively 3 to 5% of phenol and salicylic acid and thymol, and with birch tar 10 to 20% for psoriasis; with 30 to 50% of sulphur or 10% of storax for acne and scabies;—with 5% of chrysarobin or naphthol; and with 10% of ichthyol, resorcin, iodoform, naphthalene or Ⓟ white precipitate.

Monsonia ovata. A Cape Geranium. Is closely related to and used in same manner as Geranium Maculatum.—N.S.D. A South African plant used as a native remedy for dysentery. Tincture, 1 in 8, Alcohol (90%). *Dose.*—1 to 4 drachms every 3 or 4 hours. Liquid Extract 1 = 1. *Dose.*—10 to 30 minims.—In dysentery with excellent result. Must be used fearlessly as to dose. Effectual in 3 days where Ipecac. and Bismuth fail.—R. A. J. Asbury, L. ii./15,1318. **Monsonia biflora.** As prophylactic to hæmorrhage in enteric fever at the seventeenth or eighteenth day, contains an active principle *entericin*—neither alkaloidal nor glucosidal. *Dose.*—½ to 4 drachms every 4 to 6 hours.

Mori Succus. — Mulberry Juice. *Dose.*—1 drachm. The juice of the fruit of *Morus nigra* (*Moraceæ*). Mild laxative Used in the form of **Syrupus Mori.** Mulberry juice 20, heat to boiling point and filter Dissolve sugar 36 in filtrate and add Alcohol 90% 2½ to the liquid.

Moschus (B.P. 1898), **Ph. Ned.** Musk. *Dose.*—5 to 10 grains. The dried secretion Grain Musk from the preputial follicles of the musk deer, *Moschus Moschiferus* (*Ungulata*). This is believed to be wrong—the Secretory Gland is a *special* Gland.—*cf.* Fr. Cx. A useful nerve stimulant in cases of exhaustion in fevers and blood poisoning. Of value both for nervous excitement or nervous collapse. Is effective in obstinate hiccough and infantile convulsions. **Mistura Moschi.**—Musk 5 grains, Gum Acacia 5 grains, Syrup of Orange 1 drachm, **Rose Water** to 1 ounce. **Tincture,** U.S.—1 in 20 Alcohol 50% approximately. *Average dose.*—1 drachm. A Tincture of Artificial Musk has been used in whooping cough. In cardiac failure of acute pneumonia it has been given with camphor in pill. We have known 10 grain cachets to be successful in pneumonia.

A powerful heart stimulant. 1 grain with 1 grain quinine in a pill every four hours. Worth trying in influenza.—A. Ransome, B.M.J. i./19,307.

The odour of Musk is due to muskone $C_{15}H_{28}O$ or $C_{16}H_{30}O$.—Thorpe, 1912, Vol. III., 553.

The butyl derivatives of many aromatic nitro-hydrocarbons are sold as **Artificial Musk.** Musk Baur, trinitro-meta-butyl toluene $C_6HCH_3(NO_2)_2C(CH_3)_3$, is formed by nitrating m-butyl-toluene with fuming nitric and sulphuric acids.—Thorpe, 1912, Vol. I., 586.

Muira - Puama.—This drug, which comes from Brazil, has been described as belonging to *Liriosma Ovata*, Miers (fam. *Olacaceæ*). It is said to

contain an alkaloidal crystalline substance, an amorphous bitter substance, a little fat, and two kinds of resinous acids. A careful examination which we conducted did not confirm the statement as to the presence of an alkaloid. The samples of roots which we examined were, however, obtained in the ordinary way of commerce, and as these Brazilian drugs are much confused (different plants go under the same name in different provinces) it is just possible that one of the number of plants sold under the name Muira may contain an alkaloid. It has an irritating action, also tonic aphrodisiacal properties. Efficacious in the treatment of nervous disorders.—F.N., 1906.

Pilula Potentin Composita contains Muira Puama Extract 1 grain with Ovolecithin 1 grain. A useful nerve stimulant and aphrodisiac. *Dose.*—3 to 6 per diem before meals. The pill has been described in the Am. Jl. Ph. as being in use by the French. As a fact the name and the ingredients were suggested to us by the late Campbell Williams.

Myricin. *Dose.*—2 to 5 grains. The powdered extract of *Myrica Cerifera*: An astringent and stimulant, and in large doses, emetic. For diarrhœa and jaundice.

Myristica, Nutmeg (*Off.*). *Dose.*— 5 to 15 grains (**0·3 to 1·0 Gm.**). Dried seed of *Myristica fragrans* (*Myristicaceæ*) with testa removed. Aromatic and carminative. Contains **Nutmeg Oil.** *Syn.* **Ol Nucis Moschatæ.** *Dose.*—½ to 3 minims. Colourless or yellow with Sp. Gr. 0·870 to 0·925. Soluble in 3 volumes of 90% alcohol. Has properties representative of the seeds. The expressed or concrete oil of nutmeg of yellowish colour contains **Myristicin** $C_{12}H_{14}O_3$=206·172. It is occasionally employed as a gentle local stimulant. **Spirit of Nutmeg** (*Off.*). *Dose.*—5 to 20 minims. Notes on the various forms of Mace of commerce.—Holmes, P.J.ii./08,652. Poisoning by nutmeg—three cases.—B.M.J. i /09,1005. Although Oil of Nutmeg and Mace only cause fatal poisoning in a rabbit in doses of 10 to 12 Gm., and a single nutmeg is capable of producing serious effects in man, it should be remembered that Oil of Nutmeg is very variable, some containing hardly any myristicin. The narcotic property of Nutmeg is attributable to myristicin, and it appears from experiments on animals that this substance when associated with the other constituents of nutmeg is more readily absorbed than when in the pure state. The lower animals are much less sensitive to the direct action on the cerebral function than man. Nutmeg does not appear to contain any other substance of physiological action on animals.

Linimentum Myristicæ L.H.—Oil of Nutmeg 1, Olive Oil 3.

Terpeneless Nutmeg Oil, 1 is about equivalent to 5 of the original Oil.

Ceratum Nucistæ. *Syn. Muskatbalsam.* **Stomachic Balm** P.G.V. Yellow Wax 2, Arachis Oil 1, Oleum Myristicæ 6, melted together and strained and moulded into tablets—used for rubbing abdominal region in infants (Hager).

Myrrha *Off.* *Dose.*—5 to 20 grains. Yellowish or reddish gum resin from *Commiphora Myrrha*, *Off.*, (*Balsamodendron Myrrha*, B.P. '98), and other species. Soluble in water to the extent of about 50% (forms whitish emulsion on trituration with), the remainder being mostly soluble in alcohol 90%. It is soluble in alkalis, *e.g.*, Potassium Carbonate. A favourite constituent in mouth washes, *e.g.*, Tincture of Myrrh and Borax, 1 of each in Eau de Cologne 20. Nitric acid should give with genuine myrrh a transparent dirty yellow liquid. False myrrh may give a bright yellow solution and bdellium is not dissolved. P.G.V. test—not more than 65% insoluble in boiling Alcohol Ash 7%.

Tincture (*Off.*), 1 in 5 alcohol 90%. ***Flavoring.***—Glyl or Syl Menthæ Piperitæ or Lavandulæ; Extractum Glycyrrhizæ Liquidum.

For description of the literature of Myrrh, *see* E. M. Holmes, P.J. ii./13,116.

Myrtillus (*Vaccinium Myrtillus*).—Bilberry or whortleberry, the Blueberry of Canada. An extract or jam has been employed with good results in dysentery, and has been painted on the tongue in stomatitis. It is said to be of great value in typhoid, rendering the intestine aseptic. Suppositories containing 1 Gm. of the extract, and a liquid extract 1=2 of bilberry are prepared. An enema is also used. *Dose.*—2 ounces p.d. The fruits are in P. Austr.

In chronic colitis the preserved juice and the liquid extract of the berry are excellent.—G. W. Major.

Myrtol.—A constituent of myrtle oil; has been recommended in putrid

affections of lungs and air passages. Expectoration lessened, but no effect on bacilli. *Dose.*—5 to 15 minims on sugar. **Capsules** contain 2 and 5 minims.

℗ **Narceina.**—$C_{23}H_{27}NO_8,3H_2O$ = 499·387. *Dose.*—¼ to 1 grain. An Opium Alkaloid soluble in alcohol, hardly in water. Hypnotic sedative of doubtful utility. ℗ **Narcyl** is Ethyl Narceine Hydrochloride $C_{25}H_{31}NO_8HCl$ = 509·849. *Dose*, divided, up to 1 grain per diem. White crystals, analgesic, slightly stimulant—not hypnotic. Action is similar to morphine but is not largely used in medicine.

℗ ***Nicotina.**—*Syn.* PYRIDYL-METHYL-PYRROLIDIN. $C_{10}H_{14}N_2$=162·178. *Dose.*—⅛ to 1 grain. Colourless liquid (Sp. Gr. 1·011) volatile alkaloid (darkens in time) from Tobacco (*Nicotiana Tabacum*). Has been used hypodermically for tetanus. *Antidotes.*—Emetics, stomach-pump, Tannic Acid (small quantities repeatedly) stimulants.

Infusum Tabaci 1 in 20 has been ordered as an ingredient in a hair lotion thus—Cantharides Tincture 3, Sal Volatile 3, Lavender Water 3, Tincture of Strophanthus 2, Glycerin 2, Tobacco Infusion (1 in 20) *q.s.* to 64.—B.C.D. i./15,363.

Toleration to nicotine. Normal animal tissues have the power to destroy a small quantity of the alkaloid nicotine. The tissues of animals which have been rendered tolerant to nicotine destroy a considerably larger amount. There is evidence to show that the destruction of the nicotine is not due to a chemical combination with the tissues, but that, on the contrary, it is brought about by ferment action.—W. E. Dixon. Somewhat similar toleration is that of Alcohol and Morphine—these become oxidised.—Na., Mar. 16, 1911, p. 101.

The action of Nicotine and other pyridine bases upon muscles and on the antagonism of Nicotine by Curarine.—Nature, Mar. 17, 1910, p. 87.

Perfusion of the heart with Nicotine, animal experiments.—L. ii./17,759.

The *Lancet* Laboratory conducted an enquiry into the toxic factor in Tobacco. There is difficulty in estimating Nicotine in presence of Ammonia. In the method employed Nicotine was separated from the latter by means of Iodine. Pipe mixtures contained the largest amount of Nicotine (2·04 to 2·85%), Egyptian, Turkish and Virginian cigarettes came next with 1·38 to 1·8%. A British cigar contained less (1·24%) and a Havana cigar least of all (0·64%). The cigarette (from any tobacco) yields least of its Nicotine to the *smoke*, while the pipe yields a very large proportion (70 to 80% in some cases) of its Nicotine to the smoke reaching the mouth of the consumer. Cigarette smoke contains, however, Furfural (a harmful substance) especially the cheap Virginian cigarettes—this is practically absent in the smoke both of the cigar and pipe. Further the cigar, pipe and Egyptian and Turkish cigarettes all yield Ammonia, which is an antidote to Furfural and Aldehydes generally (see also L. i./10,662—Thiocyanates). The cheap Virginian cigarettes contain very little Ammonia. (It must be further remembered that it is so often the cigarette smoker who is guilty of excess.)—L. i./12,944; ii./12, 547,1823. For percentage of Nicotine in Tobaccos see also B.M.J. i./09,911.

The view is expressed that there must be some other toxic effect in Havana cigars as, though the Nicotine content is low, they are not tolerated so well as the mild British cigars.—L. ii./12,1511.—See also *ibid*, 1410.

Nicotine nearly equals adrenalin in power of raising blood pressure. Tobacco must be barred where raised high tension indicative of danger.—Brunton, L. ii /08,1132. The influence of Tobacco as cause of arteriosclerosis. *cf.* p. 573.

Tobacco 100 Gm., as cigarettes, yield when burnt in conditions approximating those which occur in smoking: HCN 0·08 Gm. Pyridine 0·146 Gm., Nicotine 1·165 Gm., NH_3 0·36 Gm., ***Carbon Monoxide*** 410 Cc. (No CO is produced in *Opium smoking*).

Ordinary Virginian tobacco, from which cigarettes are made, contains weight for weight nearly twice as much Nicotine as Manila cigar tobacco, but when burnt during smoking the smoke from the cigar contains more than twice the amount of Nicotine as that from the cigarette.

Generally speaking, most of the Nicotine in smoking is destroyed during combustion. A smoker never forms a very strong craving, but were he to inject his Nicotine the tale might be different. Carbon Monoxide poisoning liable to occur from cigarettes in excess. All the symptoms are in evidence in the man who smokes 20 cigarettes a day.—Prof. Dixon, B.M.J. ii./21,819; L. ii./21,1071.

*Agricultural and Horticultural Poison. See note under Arsenic.

Carbon Monoxide in tobacco smoke. The amount varies according to rate of smoking. In general, a normal sample of cigarette smoke will contain between 0·5 and 1% of CO. A cubic foot of straight coal gas contains as much CO as 4 cigars. CO may apparently replace oxygen in the blood without serious harm.—Prof. H. E. Armstrong, B.M.J. i./22,992.

Anti-cigarette League in Chicago made some exaggerated statements *re* Cigarettes.—L. ii./21,927.

Chronic Nicotine poisoning from tobacco on the arteries, heart, eyes, etc., far worse than Opium and Cocaine evil—probably victims number 1,000 to 1 of the latter.—W. V. Furlong, B.M.J. i./22,862.

Tobacco (a well-known and popular cheap brand) dust, used as snuff, found to contain 0·66% of solid *Cannabis Indica*, caused poisoning symptons.—R. L. E. Downer, B.M.J ii./23,521. See also Lieut.-Col. W. S. J. Shaw *ibid.* 586 and T. F. Hugh Smith *ibid.* 590.

Nicotine Manufacture.

Dissolve commercial Tobacco extract in water made strongly alkaline with Caustic Soda and extract with Petroleum Ether. Shake out latter with Dilute Sulphuric Acid. Make this acid liquid alkaline with Sodium Hydrate and again extract with Petroleum Ether. Distil off and rectify the alkaloid in a current of Hydrogen.—P.J. i./13,357.

Tobacco smoke is powerfully germicidal containing *inter alia* Pyridine a potent germicide. It rapidly destroys the cholera vibrio. During an epidemic of cholera in Hamburg not a single workman engaged in the cigar factory was attacked by the disease. Later it was stated amongst 5,000 cigar makers only eight cases and four deaths from cholera occurred. Tobacco smoke also destroys the bacilli of pneumonia.—L. i./13,406.

℗ **Nicotine Salicylate.** $C_{10}H_{14}N_2.C_6H_4OH.COOH = 300·261$. White crystals freely soluble in water. 1% Ointment in skin affections useful.

℗ *✱ 'X.L. All' (T.M. 175113, 185789, 194026, 215934, 239016, 265337, 365597). Fumigator contains Nicotine 37·3%, Camphor 34·3%, Alcohol 15·1%. Has caused poisoning. Use of Spray, Fumigant, and Paste.—P.J. ii./08,722.

A Solution of one ounce of Nicotine in ten gallons of water is used as an insecticide for hop-spraying—500 gallons are used per acre. It is the best insecticide as it kills apple and plum aphides. It is also used as a sheep dip. —C.D. The addition of Saponins to Insecticide Emulsions is an advantage.—

Fruit growers, etc., complain there is difficulty in obtaining supplies of tobacco extract. A variety of tobacco known as *N. rustica* might be permitted to be grown and denatured with Sulphur or some other mixture which would ruin it for smoking or other illicit purposes.—C.D. i./11,51.

Ocymum Viride (*Labiatæ*). **Basil Plant** so called **Mosquito Plant**—was thought to have repelling effect on Mosquitos. Others say that it neither repels nor attacks. in fact the mosquitos just ignore its presence. The Oil contains 32% Thymol, to which effect may be due.

Œnanthe Crocata (*Umbelliferæ*). Water dropwort—the most dangerous and virulently poisonous of all British native plants. It contains no alkaloid. Cane Sugar to the extent of 3·8% of the dried material was deposited in a crystalline form from an alcoholic extract of the plant. A yellow essential oil with unpleasant odour was also obtained from this extract. The portion insoluble in water consists of a viscid resin amounting to nearly 3% of the weight of the plant taken.—P.J. ii./11,296.

Stated to contain a toxic principle as a neutral resin, probably identical with or including the so-called Œnanthotoxin, giving rise to convulsions by acting on the spinal medulla. Has poisoned children, being mistaken for Angelica. The roots resemble parsnip and are not unpleasant to the taste.

Oleum Crotonis (*Off.*). *Syn.* **Oleum Tiglii, U.S.** *Dose.*—½ to 1 minim, Fr. Cx. gives max. single dose 0·05 Gm. (=1 minim approx.). Max. during 24 hours 0·1 Gm. (=2 minims nearly). Expressed from seeds of *Croton Tiglium* (*Euphorbiacæ*). Sp. Gr. 0·940 to 0·960. A sample we examined, 1914, had Sp. Gr. 0·946. *Soluble in* Ether and in Olive Oil. A powerful skin irritant, will blister, and even cause suppuration and scarring. It has been found possible to immunise animals to the poisonous effects of Croton Oil by gradual increasing dosage of 'Crotin,' *vide* U.S.D. Has been employed for tinea. The **Liniment** well diluted may stimulate growth of hair on bald patches.

*Agricultural and Horticultural Poison. See note under Arsenic p. 190.

Also used as a counter-irritant, but may produce powerful inflammation. In pneumonia of great benefit. Internally so violent a purgative that it is rarely given except to lunatics for obstinate constipation, and in cases of apoplexy (one or two drops placed on the back of the tongue). May be given as **Compound Castor Oil Capsules**, *q.v.* ***Antidotes.***—Olive Oil or milk as diluent. Opium to relieve pain and irritation.

Oleum Crotonis Compositum. Mix Blistering Fluid 6 drachms and Almond Oil 1 ounce. Allow Ether to evaporate and add Croton Oil 40 minims. Used in whooping cough—a success.—W. J. Midelton, B.M.J. i./23,746.

ABOR ARROW POISON is believed to be a paste made by pounding the soft parts of Croton Tigilium : refs. last Edn.

Croton Gubouga.—Has a reputation in the Eastern Transvaal as a remedy for malaria. The seeds and bark have been used. Prof Greenish, P.J.ii./18, p. 289, found an acrid constituent. An acid 4-Hydroxyhygric acid isolated. —J. A. Goodson & H. W. B. Clewer, J. C. S., Aug., 19, p. 923.

Oleum Croton Elliottianus, TO BE CALLED 'OLEUM ELLIOTT' to distinguish from Croton Oil (*Off.*). *Dose.*—1 to 3 minims. *Capsules* are prepared containing ½ minim in each. *Dose.*—Two capsules at night for laxative effect. Three to five capsules for effective purgative action.

The oil of the seed of this East African plant has Sp. Gr. at 15° C. 0·9242 to 0·9246, Acid value 15·5 to 15·9, Saponification No. 188·5 to 189·4, Iodine Value 143·0 to 147·5. The yield of oil from the seed is about 30%.

Medicinal action.—According to the recent investigations of a well-known physiologist the oil given as such (not in capsule) has an acrid action on the soft palate and causes eructation shortly after taking a dose—this is in great measure prevented by giving in capsules. A dose of ½ minim usually produces no evacuation but two to three ½ minim capsules produce a copious softened evacuation. Three capsules to 5 as stated are an effective purge. Six produce abundant watery evacuation in 3½ to 4 hours (no griping).—Nov. 1916. For a full account see the 'Physiological action of the Oil and Seed of Croton Elliotianus,' by J. Theodore Cash and W. J. Dilling, Jl. Pharm. and Ex. Therap., Vol. VI., No. 2, Nov., 1914.

Oleum Graminis Citrati (*Off.*). INDIAN OIL OF VERBENA or LEMON GRASS. —Distilled Oil from entire herb. Carminative, with agreeable odour, contains Citral, Citronellal, &c.—E.P.I. i./243.

Oleum Rhodii.—The source of 'Lignum Rhodii' of the older writers has never been accurately determined. One writer says the wood was brought from the Canary Islands, *e.g.*, the wood of *Convolvulus Scoparius* and *Convolvulus Floridus*. Another suggestion is, that the wood used was *Genista Virgata* or *G* (now *Cytisus*) *Canariensis*.—E. M. Holmes, P.R., Feb., 1911.

Oleum Rosæ. *Syn.* **Otto or Attar of Rose.** Distilled from the fresh flowers of *Rosa damascena* (3,000 yield 1). *For Characters and Tests, see Vol. II.* **Rosettol.**—An artificial Otto with distinct odour of roses, probably more penetrating than the natural oil. It is entirely free from Stearoptene, *i.e.*, is fluid at ordinary temperatures. **Liquor Rosæ Dulcis.**—Otto of Rose 8 drops, Carmine 2 drachms, Potash Solution ½ ounce, Alcohol 90% ½ ounce, Glycerin to 10 ounces. Ph. Form uses Syrup, but we find glycerin much better—no deposit. Useful for scenting and colouring pharmaceutical and toilet preparations. **Pulvis Rosæ Compositus.** *Dose.*—Ad libitum. Oil of Rose and Chloroform of each 1 (or combined 4 drops), Acacia 145 (grains), Sugar 840 (grains), Solution of Carmine 13 (drops). Useful to dilute powders such as Calomel, Grey Powder and Jalapin, also to colour and flavour mixtures—¼ or ½ ounce in 6 ounces. **Unguentum Aquæ Rosæ.** (*Off.*) *Syn.* CERATUM GALENI : UNGUENTUM GALENI; COLD CREAM. E. W. Lucas finds it best to omit Spermaceti from this Ointment. His form is : White Beeswax 18, Almond Oil 61, Borax 1, Rose Water 20, Otto of Rose 0·1.—B.M.J. ii./13, 1013. This was adopted *Off.*

Ononidis Radix, P.G.V., Ononis Spinosa, L. Rest-harrow Root (*Papilionaceæ*) contains several glucosides. Infusion 1 in 10 five ounces *pro die* as diuretic and blood purifier.

Origanum Majorana (Sweet Marjoram) and **O. Vulgare** (French Codex, Common Marjoram) (*Labiatæ*) have been used medicinally. Value is attributed to the essential oil contained. Superseded by Oil of Thyme (*q.v.* Thymus Vulgaris), which is often called in commerce Oil of Origanum.

Oil of Sweet Marjoram is obtained from the fresh flowering herb (*O. Majorana*), which is grown chiefly in Spain. It has Sp. Gr. 0·890 to 0·910. Its constituents are Terpinene, Terpineol, Terpine Hydrate, Borneol and Camphor.

For "*Oil of Origanum*" several species are used, *e.g.*, in Trieste *O. Onites* and *O. Hirtum*. In Asia Minor various species Cyprus Oil is obtained from *O. Majaranodes* and contains 80% **Carvacrol,** Sp. Gr. 0·960 to 0·970. Trieste Oils have Sp. Gr. 0·940 to 0·980. Phenols 60 to 85% ; Smyrna Oils Sp. Gr. 0·915 to 0·945. Phenols, 25 to 60%. *Cyprus Oil is soluble* 1 in 2 to 1 in 3 in Alcohol 70%. It also contains Cymene, a characteristic Terpine Origanene, and a small amount of another Phenol considered to be Hydroxymethoxy-cymene which gives a violet colour with Ferric Chloride.—E. M. Holmes, P.R., 1913,4,74,389; Y.B.P., 1913,85; C. T. Bennett, P.R., Nov. 13,389.

Aromatic Tonic. Carvacrol preponderates in all these Origanum Oils whilst Thymol preponderates in Thyme Oil.

As a remedy against ***hookworm infection, Carvacrol*** has been suggested in U.S.A. Its cost (made from Turpentine) would be low. It is liquid at body temperature, hence would come in close contact with the intestinal wall. Experiments showed it has about same toxicity as Thymol.—A. E. Livingston, Hyg. Lab. U.S. Pub. H. Serv. Abst., C.D., June 24/22,817.

Spurious Oil from Calamintha Nepeta.—E. M. Holmes, P.R., Dec., 1912,322.

Orthosiphon Stamineus. N.O. *Labiatæ*. First imported from Java but it is widely distributed in the East also. Contains a glucoside. Tincture of leaves 1 in 10 of S.V.R. An aqueous extract—in diabetes.—C.D. '19,580.

Pœonia Officinalis. The red peony of the gardens. The root has acid taste. The Greeks possibly usedit as a wound-dressing—Sir. Chas. Ballance, L i./20,5.

Pareira (B.P., 1898). *Average dose.*—30 grains. Dried root of *Chondrodendron tomentosum*. *Uses.*—Similar to those of Buchu. Employed in chronic inflammation of the genito-urinary tract. **Extractum Pareiræ Liquidum** (B.P., 1898). *Dose.*—½ to 2 drachms. Extract the Pareira Root in No. 40 powder with boiling water. Evaporate the liquor until it contains 33⅓%extractive matter. Add to 3 volumes of such, Alcohol 90% to produce 4. For *Greenish's formula—vide* P.J. ii./04,701. Examination of the root alkaloids, Beberine and others *see* Arch. Pharm., 250, 684.

Passiflora Cerulea. Tincture made by macerating the crushed flowering herb in an equal weight of 90% alcohol used in insomnia. *Dose.*—30 minims at bedtime. The leaves contain a notable proportion of Prussic Acid.—H. Leclerc Bul. Gen. de Therap., P.J.ii./20,220.

Patchouli—Genuine Patchouli is from Pogostemon Patchouli (Bell) *Labiatæ*. The yellow volatile oil is contained in the glands in the epidermal cells, in the hairs and in the central leaf tissue. The chief supplies of the leaf come from the Straits Settlements, and recently from the West Indies. Description of various Patchoulis of Commerce.—Java from Pogostemon Heyneanus, Khasia from Microtæna Cymosa, Chinese M. Robusta, etc. Contains Cadinene 40 to 45% and Patchouli Alcohol.—E. M. Holmes.

Pepo, U.S.—Ripe seed of *Cucurbita Pepo* (*Cucurbitaceæ*), Pumpkin. *Average dose.*—1 ounce. Said to be a good remedy for tapeworm, given before breakfast, followed by coffee and later a brisk cathartic. The oil suggested.—B.M.J. i./09,71, but the opinion is expressed that any value that the seeds may possess when given in substance in this way must be attributed to mechanical action.—Am. Jl. Ph., Oct., 1910, 484.

Phaseolus Radiatus.—The fruits called by the Malays Katjany-idgo beans have been used in beri-beri. Known as a remedy since 1747, when it was used by Rumulus, a Dutch medical man. 150 Gm. daily given; result to be looked for in 14 days.—' La Caducée,' March, 1905,79.

The beans when used to add to rice to diminish the chance of infection by beri-beri (*q.v.*), have an unpleasant flavour and natives avoid eating them if they can. They are boiled into a sort of porridge with rice (even polished rice may be used) in the proportion of ⅓ pound of beans to 1⅓ pounds of rice. This reduces the unpleasant flavour. If to this treatment 7½ grains of Quinine be given every fifth and sixth day, the chance of malaria is also minimised. The rice should, if possible, be freshly husked daily after the manner of the natives and not of the polished variety—from an account of a successful expedition in Dutch New Guinea.—L. ii./11,1571.

Phlorhizin, $C_{21}H_{24}O_{10}2H_2O = 472{\cdot}329$. *Syn.* PHLORIDZIN. A glucoside from various rosaceous trees, in pinkish-white crystals, sparingly soluble in water, in alcohol 90% 1 in 4 ,and in ether, and induces artificial diabetes

(glycosuria) in doses of at least 15 grains. The drug is a valuable mild tonic suitable for children ; a substitute for quinine. *Dose.*—Tonic 5 grains, Antiperiodic, 15 grains. Diminished Phloridzin glycosuria indicates disease of the kidney, and complete absence of sugar should be regarded as a sign of advanced renal disease.—L.t ./07,717, see also *Vol. II.*

Phytolaccin. *Dose.*—1 to 5 grains. Extractive from *Phytolacca Decandra*, Poke Root (*Phytolaccaceæ*).—U.S. VIII. Has emetic, cathartic and alterative properties. Has been used in rheumatism and syphilitic affections. A tincture 1 in 10 alcohol 45%. *Dose*, 3 to 10 minims. **Fluidextract**, U.S., VIII., 1=1 by Diluted Alcohol. *Average dose*, Emetic 15 minims ; alterative 1½ minims. Locally for painful mammæ.

Pichi.—Leaves and twigs of *Fabiana imbricata* ; useful in gravel and some kidney diseases. **Liquid Extract.** *Dose.*—10 to 60 minims. Has given good results in gonorrhœa and cystitis. **Tablets of the Solid Extract** containing 4 grains equivalent to 1 drachm of Liquid Extract are preferred by patients, and have been found useful in genito-urinary diseases. In gonorrhœa with lymphangitis, œdema, etc., good results. **Compound Tablets of Pichi Extract.**—4 to 8 grains with Salol and Tannin of each 2 grains useful to combat bacteria.—F.N., 1909.

Picrorhiza (*Off.*).—*Dose.*—10 to 60 grains. Dried rhizome of *P. kurroa.* (*Scrophulariaceæ*). Tonic, antiperiodic, aperient.—This and Amphicome Emodi are called Kaur. Inferior to quinine.—I.D.C.

Ext. Liquidum (*Off.*). *Dose.*—15 to 60 minims. 1 in 1 Alcohol 60%.

Tinctura (*Off.*). *Dose.*—½ to 1 drachm. 1 in 4 Alcohol 45% (was 1 in 8).

℗ **Picrotoxinum** (B.P. 1898). $C_{45}H_{50}O_{19}=894{\cdot}625$, probably consisting of 2 molecules of Picrotoxinin $C_{15}H_{16}O_6=292{\cdot}203$, with 1 molecule of Picrotin $C_{15}H_{16}O_7=310{\cdot}219$. Picrotin is said to be comparatively inert.—Y.B.P. 1913,208.

Dose.—$\frac{1}{100}$ to $\frac{1}{25}$ grain. Fr. Cx. *Max. single dose.*—$\frac{1}{32}$ grain, max. during 24 hours $\frac{1}{10}$ grain approximately. A neutral crystalline principle obtained from the fruits of *Anamirta paniculata* (*N.O. Menispermaceæ*)—or Cocculus Indicus (growing on the Malabar Coast) ; does not form salts. Nearly entirely soluble 1 in 330 of water, and 1 in 13 of alcohol 90%, and about 1 in 500 of fats ; its taste is bitter. Picrotoxinin has M.pt. 201° C. and Picrotin 249° C. The combined substance melts at about 200°. Lævorotatory, $a=-29{\cdot}26$ at 16° C. (Absolute alcoholic solution of 4·1 Gm. in 100 Cc.).—Fr. Cx.

Gives good results in checking night-sweats (does not like Atropine cause dryness of the throat), also employed in epilepsy and chronic alcoholism : overdoses cause stupor, delirium, and convulsions (by acting on the medulla). It increases the secretion of the mucous and perspiratory glands. Its action in checking night sweats is explained by Cushny as probably due to its increasing the respiration and thus preventing that stimulation of the nervous mechanism of perspiration which occurs through the partial asphyxia.

Antidotes.—Administer emetics, use the stomach tube, then give Chloral and Potassium Bromide, then stimulants.

℗ **Hypodermic Injection.**—1 in water 36 *Dose.*—3 to 6 minims.

℗ **Liquor.**—Picrotoxin 1, Glacial Acetic Acid 30. Dissolve and add Distilled Water to 250. Filter. *Dose per os.*—2 to 12 minims in water. Is palatable and keeps in solution at all temperatures.

℗ **Pills** of $\frac{1}{30}$, $\frac{1}{50}$, $\frac{1}{60}$, or $\frac{1}{100}$ grain form suitable doses for checking night-sweating of phthisis taken for 2 or 3 nights successively. The drug is slightly cumulative, may thus be temporarily stopped with effects persisting. A pill of Picrotoxin $\frac{1}{60}$ grain, Atropine $\frac{1}{120}$ grain with Agaricin $\frac{1}{12}$ grain, is said to act even better.

In addition to the body Picrotoxin which occurs in the seed only, the tasteless alkaloid Menispermine has been found in the pericarp of the fruit.

'Menispermin,' an extractive substance (powdered) obtained from various species of *Menispermum*. *Dose.*—1 to 5 grains. A tonic laxative, diuretic, stimulant said to be of value in indigestion. Beer and rum were impregnated with cocculus before the Food and Drugs Act came into force.—Pr.,Feb./09,266.

Structure of Cocculus Indicus. Sections of fruit and seed.—T. E. Wallis, P.J. i./21,306.

Pimento (Allspice). Dried full-grown unripe fruit of *Pimenta officinalis* (*Myrtaceæ*). From W. Indies. **Oleum Pimentæ.** *Dose.*—½ to 3 minims. Sp. Gr. 1.030 to 1·055 O.R., 0° to—4° ; R.I. 1,508 to 1,535 ; Soluble 1 in 3 of 70% alcohol. Eugenol content not less than 60% by volume.

Stomachic, and antispasmodic.—Put into hollow teeth to relieve pain.

A snuff composed of Powdered Pimento with addition of 3 minims of Eucalyptus Oil to the ounce is advised for hay fever to promote a healthy discharge of pituitary mucus in which the pollen grains are killed and washed away. The allspice is a local stimulant and antiseptic—the latter quality being accelerated by the co-operation of the Eucalyptus Oil.—J. Sawyer, B.M.J. ii./10,16.

Causes of Variation of the Oil.—P.R. 1918-9, 278, *See* also Y.B.P, 1919, 75,

Pimento Leaf Oil contains 89% Eugenol. The start of an important industry in Jamaica. By the fermentation of the leaves the oil spontaneously changes into iso-eugenol, the half-way product in the preparation of Vanillin. The wild Pimento trees of Jamaica could therefore compete with the growers of cloves in Africa or Cinnamon in Ceylon from the Vanillin producing point of view.—C.D., 20,1253.

Pinus Canadensis.—The hemlock spruce of the U.S.A. *Syn.* Abies Canadensis. A fluid extract is used as an astringent in leucorrhœa; and given internally for diarrhœa, hæmoptysis, and night sweats. *Dose.*—10 to 60 minims, also a distilled colourless variety in commerce.

Pinus Strobus. White Pine of America—the Syrup of the bark in that country enters frequently into Cough Syrups.—L. ii./09,203.

Piperina. $CH_2O_2.C_6H_3.CH:CH.CH:CH.CON.C_5H_{10} = 285{\cdot}245$. *Dose.*—1 to 10 grains. A crystalline principle from black and long pepper, the fruits of *Piper nigrum* and *Piper longum* (*Piperaceæ*) in large colourless prisms, which turn yellow with keeping. Melts at 130° C. (266° F). Insoluble in water, soluble in alcohol, and less soluble in ether. At first tasteless, but on prolonged contact it develops biting taste; it has febrifuge, stomachic and antiperiodic action. **Oleoresina Piperis.** *Average dose.*—½ grain. Is prepared by acetone extraction of pepper.

Piscidia Erythrina. Jamaica Dogwood (where it is used as fish poison). Extractum (Alcoholic) from the bark. *Dose.*—2 to 5 grains, and Liquid Extract 1=1. *Dose.*—20 to 120 minims. In neuralgia, toothache, bronchitis, pertussis, insomnia, and dysmenorrhœa.

Pistoia Gout Powder.—One formula says composed of Calumba and Patchouli only. Several authorities, however, give (which is more often used) Bryony Root 2½ drachms, Gentian 2½ drachms, Chamomile 2½ drachms, Colchicum Root 5 drachms, Betony Root 10 drachms. Mix and divide into 365 powders. *Dose.*—1 to be taken each day of the year in a full glass of hot or cold water.—Ph. Form. Have also been advocated for rheumatism.

Platinum, Pt. = 195·2 Sp. Gr. 21·5. This metal is capable of being heated to very high temperature without melting. It resists all acids except Aqua Regia and is hence used to make analytical apparatus. **Platinic Chloride** $PtCl_4 2HCl + 6H_2O = 518{\cdot}072$. Precipitates Ammonium and Potassium from Solutions. Solution of Platinic Chloride (*Off.*) is 5% in water. Has been given in syphilis in ⅛ to ½ grain doses. **Potassium Chloroplatinite** K_2PtC_6. Crystals soluble in water. Used in photography in acid toning baths.

Rhotanium. An alloy of the rare metals with properties similar to those of Platinum. Used for making crucibles, dishes and the like, for analytical laboratory purposes.

Polygonum Hydro-piper L. (*Polygonaceæ*) WATER PEPPER.

A nostrum for diabetes was found to consist of the dried leaves of this drug, which has a biting taste. It apparently caused a patient to be unstable on her legs and produced excited condition and dilatation of the pupils. *P. hydropiper* has been used for dropsy and the allied *P. Aviculare* for difficulty in passing urine—both have some action on the kidneys.—L. i./11,281.

Populin.— Benzoyl-Salicin, $C_{13}H_{17}(C_7H_5O)O_7 + 2H_2O = 426{\cdot}308$. From *Populus tremuloides* (*Salicaceæ*). *Dose.*—1 to 4 grains. Has antipyretic properties. A simple way of producing synthetic Populin.—P.J. ii./04,233.

Primula Obconica causes acute dermatitis in susceptible persons.—A. J. Hall.—L. i./21,427. Dermatitis venenata produced artificially by rubbing Primula Obconica leaves into the scarified skin.—R. Cranston Low, B.M.J. ii./21,559. See also A. Whitfield, L. ii./21,61.

Pruni Virginianæ Cortex. *Syn.* WILD CHERRY BARK.

The bark of *Prunus serotina* (*Rosaceæ*) contains amygdalin; on distillation with water it yields an essential oil rich in hydrocyanic acid; on moistening the bark with water, the odour of the latter is developed (*vide* also Amygdala Amara). It possesses bitter tonic properties, with more or less sedative ones. The preparations in use—the tincture and syrup—are used to palliate the cough

in phthisis, pertussis and bronchitis, in palpitation of the heart, and debility of the digestive organs. The Syrup is also a useful flavouring agent.

Ⓟ**Tincture** (*Off.*). *Dose.*—30 to 60 minims.

Virginian Prune Bark, now approx. 1 in 5. 10% Glycerin approx. used as an addition. Ⓟ**Syrup** (*Off.*). *Dose.*—½ to 1 drachm. Virginian Prune Bark, 15%. U.S. is similar.

Ⓟ**Syrupus Benzaldehydi Hydrocyanicus.**

Dose.—½ to 1 drachm. Saturate Distilled Water 10½ with Benzaldehyde, dissolve Sugar 15 in the liquid, and add 0·01 per cent. of Hydrocyanic acid. Except for the colour, which could be adjusted, this preparation corresponds closely to the Syrup of Virginian Prune.—Rutherford Hill.

Psyllii Semina.—The small dark brown seeds of *P. pulicaria* from S. Europe. The testa contains a large amount of mucilage. A **Mucilage** or **Decoction**, 1½% is employed in France as a demulcent drink similarly to the Ispaghula preparation in India. Psyllium appears to act better in correcting constipation than Agar Agar and Linseed as regards weight increase in fæces.—B.M.J.E. i./14,50.

Pterocarpi Lignum. Red Sander's Wood. Heart wood of *Pterocarpus santalinus* (*Leguminosæ*). Contains santalin, and is used as a colouring agent in come pound tincture of lavender.

Pulegium. Pennyroyal (*Labiatæ*). Oleum Pulegii, Oil of Pennyroyal, Sp. Gr. 0·927 to 0·962 Rotation +13° to +35° often adulterated.

It comes from Spain, S. France and Algeria, and contains 80% Pulegone.—P.R., Nov., 1913. Encourages menstruation—administered in form of a hot tea at bedtime. Is reputed to produce abortion. This is distinct from the oil passing under that name in U.S. VIII., *i.e.*, **Oleum Hedeomæ** from *Hedeoma Pulegioides* (*Labiatæ*) indigenous in N. America, which has similar properties. It is similar in composition.—*ibid.*

Poisoning by Essence of Pennyroyal—4 drachms taken—caused delirium and Camphor taste in the mouth. Hot tea given produced profuse vomiting. The toxic effect is produced by the Oil after the solvent Alcohol has been removed in the stomach. As a general treatment give an emetic and avoid Alcohol.—B.M.J. ii./13,746.

For *midge bites* the following is claimed to be both preventive before going out or may be rubbed into the bites when inflicted to allay itching. Ol. Pulegii ½ drachm, Tinct. Absinth. (1 in 8) 3 dr., Lin. Saponis, Lin. Camph. Ammon. of each equal parts, to 3 ounces. *Aqueous* solutions give little relief as they do not penetrate the skin.—L. i./13,1783.

Pulque is the fermented sap of *Agave Americana* and *A. Mexicana* (*Amaryllidaceæ*). Contains *inter alia* the phosphates of Magnesium, Potassium, and Calcium, and 7% of Alcohol. It stimulates renal activity, is a powerful nutritive, has been used in Bright's disease, is laxative and diuretic.

On Pulque and Pulque drinking in Mexico. The Maguey (*A. Mexicana*) flowers once in seven or ten years. Description of method of cultivation and collection of the juice with process of fermentation. The Pulque is drunk in Mexico city like beer in this country. Consumption is stated to be about 2 quarts of fresh juice per day per head. It cannot be transported any distance. It contains about 4½% Alcohol.—C.D. i./10,54. L. i./12,43.

Succus Agavæ Concentratus *Syn.* **Agmel.**

Dose.—½ ounce in half tumbler of water three or four times a day between meals. Maguey juice in a concentrated condition. Indicated in forms of acute and chronic congestion of the kidneys—in nephritis and in disease of the bladder and urethra. It is stated to have marked power in correcting and altering metabolism and in restoring kidneys to health and active function. Activity thought to be due to certain enzymes.

Pulsatilla.—*Anemone Pulsatilla* (*Ranunculaceæ*). *Syn.* **Pasque Flower.** The entire herb is used. Contains Anemonin, a crystalline substance. **Liquid Extract.**—1=1. *Dose.*—2 to 5 minims. Tincture 1 in 10, Alcohol 60%. *Dose.*—5 to 30 minims. In dysmenorrhœa and amenorrhœa.

Dysmenorrhœa relieved by Pulsatilla. Not used in cases where the amount is excessive, lasting six days or more. Most patients were unmarried. The mixture given was Tinct. Pulsatilla 4 drachms, Spt. Chlorof. 2 drachms Chloroform water to 6 ozs. 2 drachms to be taken as soon as menstrual (or pre-menstrual) pain begins and every three hours while pain continues.—F. C. Coley, B.M.J. i./22,13.

Pyrethri Flores. The dry flowers of *Pyrethrum roseum* and *P. carneum* in powder as a dusting powder to keep off insects. Those from Dalmatia are from *Pyrethrum cinerariæfolium* (*Compositæ*). A Tincture, 1 in 4 Alcohol 60%. is used as an insecticide lotion. The powdered drug may be puffed from bellows into the room to kill mosquitoes.

Dalmatian Insect Flower prefers sunny, pebbly, calcareous hill-sides dry and without irrigation and a fairly dry atmosphere. The seed in commerce is apparently dried by heat to prevent germination. Details of culture. Suggestion that it would be worth trying here.—E. M. Holmes, P.J. i./17,7.

Pyrethri Radix.—Pellitory Root (*Off.*), U.S. Fr. Cx. *Average dose.*—30 grains. Dried root of *Anacyclus Pyrethrum* (*Compositæ*). A useful sialogogue, causing considerable salivary effusion; is used in the form of tincture 1 in 5, might be made with 60% alcohol.—P.J. ii /09,142. U.S. Alcohol 94·9% vol. Must be given with caution to children, as it is powerful in effect. **Glycogelatin Pastils** are made containing 1 grain of the powder for dryness of the mouth. To promote a continuous flow of saliva and thus irrigate the ducts and so prevent ascending infection. Severe hæmatemesis is often followed by inflammation of the parotid glands. *S. pyogenes aureus* and *M. lanceolatus* found in the pus.—B.M.J i./09,1297.

Tinctura Pyrethri Composita. Tincture of Pyrethrum (Root) 2, Clove Oil 1, Camphorated Chloroform 1. As tooth-ache drops.—C.D., Oct. 21,16.

Pyridina. Fr. Cx. C_5H_5N = 79·073. *Dose.*—5 to 10 minims daily increased. A colourless alkaline liquid Sp. Gr. 0·980 with persistent odour, miscible with water and alcohol, boils at 243° F.; obtained from many organic substances by dry distillation; is contained in and combined with nicotine in tobacco smoke. Purified by shaking with moist magnesium hydrogen phosphate and then dehydrating with caustic potash. It is probably the relieving agent of various cigarettes and powders smoked or burnt for asthma and whooping cough. A drachm of it is placed on a plate in a small room in which the patient remains from 20 to 30 minutes three times a day. Is employed for making Denaturalised Alcohol.—*See* Alcohol. It is stated to be less toxic than nicotine.

Quassia (*Off.*, and B.P. '98).—Jamaica Quassia. Wood of *Picræna* (or *Picrasma excelsa* (*Simarubaceæ*). Contains picrasmin. Infusion 1 in 100. Chiefly employed as a bitter tonic. ***Flavoring.***—Syl Vanillæ, Syl Rosæ; Syrupus Zingiberis. Liquor Quassiæ Concentratus 1 in 10. Tincture 1 in 10. Alcohol 45%. By rectal injection the daily use of a strong infusion will get rid of tapeworms and threadworms. *Surinam Quassia* (not now in use) is the wood of *Q. amara* (U.S.), a branching shrub, whereas *P. excelsa* is about 100 feet high. **Extractum Quassiæ**, U.S. VIII., aqueous extract made up with milk sugar. (Powder form 1=10 of drug). **Fluidextract**, U.S., VIII., 1=1 Hydro-alcoholic. *Average dose*, 8 minims. Quassia is free from tannin, hence campatible with iron preparations as tonic.

℗ **Lotio Quassiæ.** Concentrated Quassia Infusion 1 ounce, Spirit of Rosemary 1½ drachms Sassafras Oil 30 minims, Alcohol 2 drachms, Liquefied Carbolic Acid 2 drachms, Water to 6 ounces. Shake before use. For nits in children's hair.—P.J. i./11,88. The wood contains **Quassin,** $C_{10}H_{12}O_3$ (?)=180·146 which forms lamellar crystals, soluble about 1 in 400 of water, soluble also in acid and caustic alkaline solutions. Increases secretion of salivary glands and kidneys, and stimulates digestion. *Dose.*—$\frac{1}{30}$ to $\frac{1}{8}$ grain.

Quassia Suppositories containing ¼ grain Extract with gelatin basis (15 minim size) are prepared. These have been found valuable for removal of thread worms in young children. Infantile fits in hospital practice are often due to worms. These suppositories are simple and convenient to use in comparison with Enemata. The strength may be increased.

Quassin, Fr. Cx. has formula $C_{32}H_{42}O_{10}$=586·496. *Max. single dose.*—$\frac{1}{16}$ grain. Surinam Quassia differs slightly from Jamaica Quassia. Threadworms have been discharged on the third day by 2 grain Quassia Extract Pills (Keratin coated)—one morning, noon and night. Previously 2 ounces of compound decoction of Aloes.

Anti-smoking Gum.—Quassia made up in form of a chewing gum—a substitute for smoking for the use of patients suffering from tobacco amblyopia who feel the loss of their tobacco. Finely ground Quassia 1 in gum mass 12 is not too strong for excessive smokers, particularly if there be an alcoholic complication. Where this is absent 1 in 20 is strong enough. It creates appetite.—C.D. i./09,373.

Quebracho (*Aspidosperma Quebracho*) Bark from Argentina contains [P1]Aspidospermine supplied as [P1]Sulphate $(C_{22}H_{30}N_2O_2)_2H_2SO_4 = 806{\cdot}808$ Tonic, febrifuge and antispasmodic. *Dose.*—$\frac{1}{6}$ to $\frac{1}{3}$ grain. Much larger doses, *e.g.*, 1 and 2 grains, have been given *per os* and hypodermically.—N. S. D. In heart affections with dyspnœa. Ⓟ Tincture of Quebracho 1 in 5 alcohol 60%. *Dose.*—1 drachm. Ⓟ Liq. extract 1=1. *Dose.*—10 minims.

Quercus Cortex P.B., 1885, P.G.V. The dried bark of young branches and twigs of *Quercus robur* (L.). This is the European or Brtish Oak. *Q. alba* was official in U.S. VIII.

Quillaia saponaria (*Rosaceæ*). (*Off.*, and B.P. '98). *Syn.* Panama Bark (Soap Bark). Contains quillaic acid, $C_{19}H_{30}O_{10} = 418{\cdot}335$ and sapotoxin, $C_{17}H_{28}O_{10} + H_2O = 408{\cdot}309$, closely allied to saponin. Has a sweetish but acrid after-taste and possesses emulsifying properties, causing frothing in water in which it has been macerated. Its lather kills pediculi of scalp. Soap-bark has been used as an expectorant in bronchitis, contra-indicated in inflammation of the intestines or stomach, or ulcerated condition of the mucous membrane. Is used for emulsifying tar preparations. TINCTURE (*Off.*, and B.P. '98), 1 in 20 of Alcohol (60%). Five minims of this will emulsify 1 drachm of fixed oil. Fluidextract, U.S. VIII. 1=1. *Average dose.*—3 minims. The powder has very marked sternutatory properties. Acne Lotion—Decoction of Quillaia 4 ounces, Eau de Paris 60 minims. Ammonia Solution 40 minims. Use night and morning. It has poisonous properties.

Will emulsify Lemon Oil—thus for a 'Syrup of Lemon' take Lemon Oil 1, Quillaia Tincture 1, Water 14, shake and add Syrup 236, also Tolu Balsam; thus for a 'Syrup of Tolu' take Tolu Balsam 6, Fluidextract of Quillaia 1, Alcohol 90% 5. Dissolve and add Syrup 180, shake and filter.

Examination of Quillaia Bark and Commercial Saponins. The Sapogenin assay method is best. J. Cofman-Nicoresti & S. B. Tallantyre, B.P. Conf., 1920.

Ranunculus Ficaria (N.O. *Ranunculaceæ.*) *Syn.* PILEWORT or *Lesser* CELANDINE. This drug has been used in the form of ointment. It is prepared by digesting the fresh Pilewort with melted lard 24 hours, and straining after the manner of Savin Ointment. **Suppositories** are made containing 72 grains of the ointment and 18 grains of Spermaceti; also, more convenient, a smaller size, containing 45 grains of the ointment and 15 grains of Spermaceti; have been employed in hæmorrhoids. (Advocated by Sir J. Sawyer).

For some historical notes on the drug *vide* L. i./17,42.

Resina (*Off.*, and B.P. '98).—From the crude oleo-resin of various Pines after distilling Oil of Turpentine. Yellow resin soluble in Alcohol 90%, Ether and Benzol. **Unguentum** (*Off.*), contains Resin, Yellow Beeswax, Lard and Olive Oil. CERATUM, U.S. White Wax 3, Benzoated Lard 7. OLEUM RESINÆ EMPYREUMATICUM, P. AUSTR. Brownish oil by distillation of colophony. Sp. Gr. 0·96—0·99, Saponification No. 4 to 12. Iodine No. 50 to 80.

Rhei Rhizoma (Radix).—*Dose.*—3 to 10 grains repeated. *Single dose.*—15 to 30 grains. *Rheum officinale* and other species (and the variety *R. tanguticum*, U.S.) (*Polygonaceæ*) grown in China and Thibet, partially decorticated and dried. Todaiwo P. Jap. IV. is Chinese Rhubarb. *For Constituents see Vol. II. Flavoring.*—Syl Vanillæ, Glyl Pini. Laxative and stomachic; often given with Sodium Bicarbonate, especially to children. **Extract** made with 60% **Alcohol** (*Off.*). *Dose.*—2 to 8 grains. **Fluid Extract** 1=1 made with Alcohol 75%, approx. *Dose.*—15 minims. **Pilula Rhei Composita** (*Off.*). *Dose.*—4 to 8 grains. Contains Rhubarb, Aloes, Myrrh, Hard Soap, and Syrup of Glucose. **Pulvis Rhei Compositus** (*Off.*). **Gregory's Powder.** *Dose.*—10 to 60 grains. **Syrupus Rhei Aromaticus, U.S.** *Dose.*—2½ drachms. Aromatic Tincture of Rhubarb 150, Potassium Carbonate 1, Syrup to 1,000. **Tablets of Rhubarb Soda and Ginger** contain Rhubarb 3 grains, Sodium Bicarbonate 2 grains, Ginger 1 grain. **Tinctura Rhei Composita.** (*Off.*). *Dose.*—½ to 1 drachm repeated, 2 to 4 drachms single dose. 1 in 10 of 45% Alcohol flavoured with Cardamom and Coriander. **Tinctura Rhei Aromatica, U.S.** *Dose.*—30 minims. Rhubarb 20, Saigon Cinnamon 4, Cloves 4, Nutmeg 2, Glycerin 10, Alcohol 50, Water 40.

Acute bacillary dysentery,—Rhubarb ½ teaspoonful of powder in cachets every one, two or three hours, until the rhubarb appears in the stools. Stated to be magical.—R. W. Burkett, L. ii./21,254.

Experiments to determine the nature of the action of rhubarb extract on B. dysenteriæ (Shiga, also Flexner), and the Bacillus No. 1 of Morgan. There was no distinct germicidal action.—H. C. Brown, L. i./23,382.

Rhubarb Leaves—Notes on use of.—L.i./17,708. Poisoning by, *ibid.*, 847. A little powdered chalk added to the leaves would render them safe in cooking. The leaves in a case of supposed poisoning were stated to contain approximately equal parts of Potassium Binoxalate and Calcium Oxalate—10 grains of each in a pound of leaves. The Calcium Oxalate would be inactive. It is doubtful whether 3½ grains—equivalent approximately to ⅓ lb. of leaves—a liberal helping—was the cause of death. A much larger quantity of Oxalic Acid—60 grains has been taken with recovery.—Harrington Sainsbury.—L. ii./17,25. Air dried leaves contain over 0·2% oxalates reckoned as Oxalic Acid with Malic Acid 0·3 to 1·7%.—W. Kirby, P.J. i./17,497 ; ii./17,11.

Rhus aromatica. (*Anacardiaceæ*) (Sweet or Fragrant Sumach). The bark of this Canadian and U.S. plant contains Tannin and Volatile Oils. *Dose.*—5 to 30 grains has given results in incontinence of urine.—B.M.J.ii./09,752. Said to act on the muscle fibre of the bladder. **Liquid Extract** 1=1. *Adult dose.*—10 to 30 minims. 5 minims thrice daily to children under two years, and 10 minims to children 8 years.

Rhus Toxicodendron. (*Anacardiaceæ*). *Syn.* **Poison Oak.**—Poison Ivy Leaves. **Tincture.** *Dose.*—2 to 15 minims. Imported from North America, prepared from fresh leaves, 1, alcohol 2. Used for rheumatism in chronic skin affections, paraplegia, and incontinence of urine from atony of the bladder. Also for hæmorrhoids. Whitla says it gives satisfaction, but may irritate stomach and bowels.

The poisoning by the 'Toxicodendrol' contained, takes the form of an itching, burning, erythematous and herpetiform rash. The eruption spreads from the wrists to the eyelids and face. Papules, vesicles and bullæ are quickly formed, involving more or less the whole body. The skin on hands, forearms, face, neck and prepuce becomes very œdematous and covered with broken bullæ with profuse discharge. For a treatise on skin eruptions of this type see A. Whitfield, L. ii./21,61.

'Toxicodendrol' is insoluble in water but readily dissolves in organic solvents. 0·005 mgr. of it applied to the skin is sufficient to produce local symptoms with pain. McNair considers the toxicity is due to a polyhydrophenol named 'Lobinol,' poisoning occurring from actual contact with the resinous sap of the plant or through an intermediary agent, *e.g.* soot in smoke, clothing, cordwood, etc.—J.A.M.A., per Jl. Trop. Med., June 1/23,208.

Lead Acetate dissolved in Alcohol gives speedy and permanent relief.

Tincture of Sanguinaria Canadensis dabbed on with a soft cloth, is a remedy for the irritation, as also Calamine Lotion.

Compresses of Borax 3%, Permanganate of Potash 1—2%, or 10% solutions of Sodium Hyposulphite or Magnesium Sulphate advised. Lead lotions and ointments should be avoided.—E. A. Sweet and C. V. Grant, per T. D. B. Vol. 17/21,264.

Rosæ Gallicæ Petala (*Off.*), U.S. The fresh and dried unexpanded petals. **Confectio Rosæ Gallicæ** and **Infusum Rosæ Acidum** and Syrup Rosæ (form of latter altered) are *Off.* Infuse 15 minutes. **Fluidextractum Rosæ**, U.S., 1=1 Glycero-hydro-alcoholic.

Mel Rosatum P. Jap. III. (now omitted). Macerate Rose Petals 1 in dilute Alcohol 5, 24 hours with shaking, press and mix with the liquor Honey 9, Glycerin 1, and evaporate to 10.

Rubia Tinctorum (*Rubiaceæ*), Dyer's Madder. The root of this plant is known in Germany as **Krapp-wurzel.** A native of Southern Europe and the Levant—cultivated in Holland, etc. A dye stuff yielding Alizarin, Xanthopurpurin, etc., not to be confused with the Indian Mudar (Calotropis). It has been used in amenorrhœa and rachitis.

Rubus Chamæmorus (*Rosaceæ*).—Cloudberry, Norwegian blackberry, marsh or dwarf raspberry. Also grown in Newfoundland. Known in Russia as Moroshka and in Germany as Torfbeere, Maltebeer, Woollenbeere, and Zwerg Maubeere. The leaves of this are diuretic, useful in nephritis, cirrhosis of liver and cardiac affections. Infusion, 1 in 12. *Dose.*—½ ounce; fluid extract, *dose*, ½ to 1 drachm. Fruit is antiscorbutic and used for hæmoptysis, will also abate fever.

Rubus villosus, a species of Blackberry; was Official in U.S. *R. Idæus* = Raspberry.

Rumex obtusifolius — the dock. — Dried root was found to contain 0·447% of iron. ✱**Fer Ascoli** (T.M. 315389) TABLETS.—A preparation with nucleins as base; contains 3% of iron. Used in treatment of anæmic girls.

Rumex Crispus.—Yellow Dock (*Polygonaceæ*). The root contains Emodin Chrysophanic Acid and Rumicin,—the last (*Syn.* Rumin) *Dose.*—1 to 4 grains in scrofulous affections, dyspepsia, astringent and tonic. Tincture 1 in 10, Alcohol 50%. *Dose.*—1 to 10 minims. **Unguentum Rumicis.**—Fresh Yellow Dock Root 1, Benzoated Lard 2, warmed two hours and strained. Used like Chrysarobin applications.

Ruta Graveolens—(*Rutaceæ*). *Dose.*—10 to 30 grains. Contains about ¼% Volatile Oil Sp. Gr. 0·880 (consisting of Methyl Nonyl-Ketone $CH_3CO.C_9H_{19}$ and Methyl-heptyl Ketone). *Dose.*—2 to 5 minims. In amenorrhœa and menorrhagia. Large doses have been given to procure abortion.

Confectio Rutæ. *Dose.*—1 to 2 dr. Fresh Rue, Caraway, Bay Berries of each 1½, Sagapenum ½, Black Pepper ¼, Honey 16. Add the first three in powder by degrees to the Sagapenum melted in the Honey with water *q.s.* Carminative and antispasmodic. Sometimes used as enema in infantile convulsions. **St. G. H.** has Rue 6, Caraway 6, Bay Berries 6, Black Pepper 1, Asafœtida 2, Honey 64, Water *q.s.* 180 grains of this with 20 ounces of Chamomile Infusion to prepare *Enema Rutæ.*—St. G. H.

℗ **Sabina,** U.S. VIII. *Average dose.*—7½ grains. FR. Cx. has this as max. single dose. Max. during 24 hours 15 grains. Tops of *Juniperus Sabina* (*Savin*), Linné (*Coniferæ*). ℗ **Oleum Sabinæ.** *Dose.*—1 minim. Has emmenagogue and abortifacient properties.

℗ **Unguentum Sabinæ,** B.P. '85. Melt Lard 16 and Wax 3 on a water bath, add fresh Savin tops bruised 8 and digest 20 minutes and express through calico. Freshly made is used in conjunction with blisters in rheumatoid arthritis, see Cantharides.

Sagapenum.—*Dose.*—10 to 30 grains. A gum-resin, rarely met with; is in yellowish-red pieces. Has a taste somewhat resembling asafœtida, and properties similar to this and galbanum, for use in amenorrhœa and hysteria.

Salep.—Tubera Salep, P.G.V., Ph. Ned. Dried tubers of various species of Ophydinæ—Orchis mascula and others. (N.O. *Orchidaceæ*). When fresh have bitter taste. They are immersed in boiling water on collection and dried; contain mucilage and have nutritious and demulcent properties; allay gastro-intestinal irritation. Mucilago Salep 1%, P.G.V. Freshly made. Salep is much sold in the Indian Bazaars as an article of diet.

Salicairine Tablets for adults and solution for children. A preparation of glucosides of *Lythrum Salicaria*, Loosestrife. Astringent, hæmostatic, sedative in diarrhœa.

Salix nigra.—The bark of this, the black or pussy willow, is used as a sexual sedative, tonic and astringent, and given for gonorrhœa and spermatorrhœa. Liquid extract, 1 in 1. *Dose.*—¼ to 1 drachm. *Flavoring.*—Syl Lavandulæ, Syl Sassafras (full doses). Solid Extract. *Dose.*—1 to 5 grains. Relieves ovarian pain and nocturnal emissions.

Salvia. Sage (*Labiatæ*). *Dose.*—15 to 30 grains. Dried leaves, aromatic, astringent, tonic.

Sambuci Flores (*Sambucus nigra—Caprifoliaceæ*), Elderberry flowers (B.P. '98). Infusion and pomade are used as domestic remedies for sores, bruises, etc. **Aqua Sambuci** (P.B. '98) is prepared from the fresh flowers (or flowers preserved with common salt), a frequent ingredient in lotions for the eyes and skin.

S. nigra contains the glucoside Sambunigrin.—E. Bourquelot, B.M.J i./21,59.

Sanguinaria Canadensis, U.S. (*Papaveraceæ*). 'Blood Root." Expectorant, emetic, tonic, for cough. *Average dose.*—2 grains. Ⓟ Liquid extract 1=1. *Average dose.*—1½ minims. Ⓟ Tincture U.S. *Average dose.*—15 minims. Sanguinaria Root 5, Acetic Acid 1, Alcohol 30, Water 50, by hydro-alcoholic macero-percolation; contains alkaloid. ℗ Sanguinarine $C_{20}H_{15}NO\ H_2O$ = 351·244 and several others, also a resinoid extractive Sanguinarin. *Dose.*—¼ to 1 grain.

Assay, employing Ether-Benzol for extraction and Citric Acid as solvent. The commercial drug assays 3 to 4% total Alkaloids.—Am. Jl. Ph., Sept., 1913.

Sansiviera. The rhizome of *Sansiviera thyrsiflora*, a native of certain parts in South Africa. We examined the root some years ago and found it to contain no alkaloid. The root possesses laxative properties, it is free from griping action, and pleasant to take. The Kaffirs chew a stick of the fresh root at a time, and swallow the juice for use as an anthelmintic, and more particularly for the treatment of hæmorrhoids,—for the latter it is

known to be efficacious. Should be given in bold doses, as the active constituents only exist in small proportion. **Liquid Extract.** *Dose.*—2 to 4 drachms. Prepared as Liquid Extract of Liquorice. As a laxative. **Solid Extract.** *Dose.*—10 to 20 grains for pills and capsules.—Oliver.

Saponins are toxic glucosides contained in Sarsaparilla and Quillaia, etc.

The word "Saponin" is a collective one implying a group of Nitrogen-free glucosides:—information as to the plant of origin ought to be given. Death from Saponins is preceded by a long incubation period with the symptoms of central paralysis. Fish die when the water they are in contains 1 in 100,000. Saponin in Salt and Carbolic Acid baths is said to aid the action of all drugs which stimulate the skin. The nasal mucous membrane is stimulated and produces copious skin secretion by the action of dilute spray, gargle or irrigation. Saponins are anthelmintic and diuretic.

The addition of Saponin to insecticidal emulsions is advantageous.—Na.

Sarsæ Radix, Sarsaparilla. *Smilax ornata* (B.P. 1898). (*Liliaceæ.*) From Costa Rica and known as Jamaica Sarsaparilla. U.S. defines *Smilax medica*, known in commerce as Mexican Sarsaparilla; or *S. Officinalis* or an undetermined species of *S.*, known as Honduras Sarsaparilla; or *S. Ornata*, known as Jamaica Sarsaparilla. Lima Sarsaparilla imported from Panama is considered best commercially, that from Honduras being of second quality. *Constituents.*—Saponins and allied bodies—see last Edn., p. 691. **Liquid Extract** (B.P. 1898). *Dose.*—2 to 4 drachms. **Liquor Sarsæ Co. Conc.** (B.P. 1898). *Dose.*—2 to 8 drachms. In chronic rheumatism, skin affections and as a "blood purifier." and in syphilis. It was of doubtful value even 150 years ago. *Incompatible* with Alkalis.

Decoctum Zittmanni Fortius. *Dose.*—3 to 6 ounces.

Sarsaparilla (cut small) 200, Water 5,200, maintain at 35° to 40° C. for 24 hours, then add Potash Alum 10, Calomel 8, Precipitated Cinnabar 2. Heat on a water-bath for three hours and add Bruised Anise and Fennel of each 10, Senna leaves (cut small) 50, Liquorice Root (cut small) 20. Continue heating for 15 minutes, strain, and press, passing sufficient water through the marc to make up to 5,000.

Decoctum Zittmanni Mitius. *Dose.*—3 to 6 ounces.

Sarsaparilla 100, Water 5,200, Lemon Peel, Cassia Bark, Cardamoms and Liquorice of each 6. Proceed as in making the stronger decoction.

Both these preparations have been used in syphilis and wasting diseases.

Sassafras Radix (B.P. 1898). *S. officinale*, or *S. variifolium* (*Lauraceæ*), U.S. The oil (*Oleum Sassafras*, U.S.), containing Safrol, destroys the vitality of pediculi; it should be applied with a stiff brush, but not touch the skin; yet, if so, a little bland oil allays the irritation it causes. **Safrol,** $[C_6H_3C_3H_5(OOCH_2)\ 1:3:4] = 162{\cdot}13$. Obtained from sassafras oil, camphor oil, and other volatile oils, is used for scenting cheap soaps, also in manufacture of heliotropin, and as an anodyne liniment in subacute rheumatism. Colourless liquid. Optically inactive. Soluble in an equal volume of strong alcohol and in 30 of 70% alcohol. *Dose.*—20 to 30 minims.

The Sp. Gr. of the oil is usually 1·068 to 1·086. O.R. + 1° to + 3°.

It is used for all lice and nits in pediculosis. In treating ringworm, the hair is cut close round to identify the patches, and the oil applied twice a day by a brush. This is continued for a few weeks if necessary. Non-irritating and pleasant to use, prevents spread of the infection, and destroys the fungus. The oil in capsule form (3 minims) may have the power of reducing body weight.

Dispensing Note.—To produce an emulsion in water a mixture of Acacia and Tragacanth Mucilage is best. Rub the oil down with the Mucilage of Acacia, *e.g.*, 3 drachms, for a 6 ounce mixture, then add gradually 1 ounce of Tragacanth Mucilage. The acacia divides the oil into particles and the tragacanth suspends them.—C.D.

Oliveri Cortex (*Off.*). Oliver's Bark or Black Sassafras Bark. Dried bark of *Cinnamomum Oliveri.* (*Lauraceæ*). Aromatic, yields an oil resembling Sassafras Oil.—P.J. 11,99,165.

Tinctura (*Off.*). *Dose.*—½ to 1 drachm 1 in 10 alcohol 60%.

Saw Palmetto.—A palm growing in America. Possesses sedative, tonic and diuretic properties. Is largely used in urethritis, gonorrhœa, dysmenorrhœa, impotence, cystitis. A liquid extract 1=1. *Dose.*—½ to 2 drachms.

Flavoring.—Glyl Lavandulæ (full dose). A solid extract is also prepared. *Dose.*—3 to 5 grains in pill or tablet. Is also frequently combined with Santal

in a miscible form.—'Sanmetto.' **Sabal,** U.S., is the partially dried ripe fruit.

Scammoniæ Radix. (*Off.* and B.P. 1898). *Convolvulus Scammonia* (*Convolvulaceæ*), containing about 10% Resin and 15% Sugar. **Scammonium,** (B.P. 1898). *Dose.*—5 to 10 grains. Emulsifies with water. The gum resin exuding from the living root on incision. **Scammoniæ Resina.** (*Off.*). *Dose.*—3 to 8 grains (0·2 to 0·5 Gm.). Prepared by exhausting the root or Orizaba Jalap with Alcohol 90% and pouring the concentrated tincture into water in a thin stream. Occurs in greenish lumps. Soluble almost entirely in Alcohol and Ether. **Scammonin** is this substance purified. Purgative in obstinate constipation. Produces copious watery evacuation in a few hours. Does not act until reaching the duodenum. *For further details of C. Scammonia and Ipomœa Orizabensis see Vol. II.*

Scilla (*Off.*). *Dose.*—1 to 3 grains. The bulb of *Urginea Scilla* (*Liliaceæ*) (*U. maritima,* U.S.), with membranous outer scales removed, cut into slices and dried. Resembles Digitalis in action. It is also expectorant and more diuretic. *Off.* are: **Acetum Scillæ,** strength 1 in 4·5 w/v in dilute Acetic Acid.—J. H. Franklin and G. G. Hammond, P.J. ii./22,85. *Dose,* 5 to 15 minims. **Pilula Scillæ Composita** and **Tincture,** *Off.* 1 in 5 of 60% alcohol. Might be made with 45% alcohol.—P.J. ii./09,142.

Flavoring.—Void of much taste. Use, *e.g.,* Syl Coriandi, Syl Anisi; Syrupus Tolutanus. In U.S. IX., are **Acetum** 1 in 10; **Fluidextract,** 1=1 Alcoholic (was Acetic) *average dose,* 1½ minims. **Syrup**=Vinegar of Squills 45, Sugar 80, Water to 100; Ⓟ **Syrupus Scillæ Compositus,** *average dose* 30 minims=Fluidextract of Squill and of Senega each 80, Antimony Potassium Tartrate 2, Syrupus *q.s.* to 1,000. **Tincture,** U.S. 1 in 10.

Squill Preparations U.S. IX. are now biologically standardised. *cf.* Digitalis, *Vol. II.*

Poudre de Scille.—Fr. Cx. Max. dose during 24 hours 15 grains. Fr. Cx. has **Extract** (Alcoholic), with max. doses provided also **Tincture** 1 to 5 Alcohol 60%, max. single dose 25 minims, max. during 24 hours 85 minims approximately.

Normal Tincture (Physiologically) of **Squill** may be of such a strength that the minimum lethal dose per 100 Gm. of frog is 20 minims, such dose proving fatal within 4 hours. *See also Vol. II.*

As a heart tonic it is not satisfactory used by itself. It seems to spend its force on the auricles, leaving the ventricles hardly affected at all. Its glucosides are failures.—G. Sharp, P.J. i./16,347.

Squill as diuretic *cf.* action of Digitalis, p. 405.

Liquid Extract of Red Squill (there are 2 varieties—the red is preferred in France) efficacious against rats. Add to bread and milk. Bairum Carbonate is deadly. Virus not advised.—L. ii./22,1081. See also F. W. Smith. P.J. i./21,139.

Scopola Carniolica (*Scopolina atropoides*).—The root of this, an Austrian plant has been imported as a substitute for belladonna, and was in U.S., 1900, with not less than 0·5% alkaloids, assayed as belladonna leaves. Scopola root contains two bases—(a) scopolamine, optically active which is identical with hyoscine, and (b) scopolamine, which is optically inactive, and which is identical with Hesse's atroscine—Naylor Presidential Address, B.P.C., P.J. i./05,123. Scopola *per os* is said to cause less dryness of the throat than belladonna, and is probably more nearly allied to hyoscyamus in its action.

Scopola Japonica is stated to contain about 0·18% alkaloids consisting of about 90% Hyoscyamine with about 5% Scopolamine, and a minute quantity of Atropine.—M. Watanabe, Int. Conl., 1909.

Scutellaria. *Dose,* 5 to 15 grains. Dried herb of *Scutellaria lateriflora,* Linné (N.O. *Labiatæ*). Used in the form of dry, greenish-brown powdered extract (scutellarin). *Dose,* 1 to 5 grains. For epilepsy, insomnia, and hiccough. **Liquid Extract** 1=1. *Dose,* 5 to 15 minims.

In epilepsy a simple infusion or extract appears to stimulate the kidneys and increases output of urea and uric acid. In chorea effects even more marked. —W. Bramwell, B.M.J. ii./15,880.

Sempervivum tectorum, Common Houseleek.

According to N.S.D. the bruised recent leaves are employed as cooling applications to burns and other external inflammations. **Succus** (preserved with 20% Alcohol) is said to cure warts.

Inoperable mammary carcinoma has been treated by injections of sterilised

Succus prepared as follows :—The expressed juice of the fresh herb is allowed to stand two hours, strained from flocculent deposit and evaporated on a water bath to half its bulk. It is then cooled, filtered and sterilised. 5 to 15 minims of unconcentrated juice were first used, subsequently passing on to the concentrated preparation. An ointment of the juice was also used and the drug was taken internally. Injections were given twice a week for twelve months with relief of pain, diminution of growth, increase of weight.

Its use was suggested by noting its effect on warts. The juice rubbed on the surface of a wart several times daily for two or three weeks will almost invariably remove the growth.—Bouverie F. P. McDonald, L. i./13,128.

Senecio.—Ragwort. *Senecio Jacobœa* and *S. aureus* (*Compositæ*) are emmenagogues, and have been employed in amenorrhœa and dysmenorrhœa especially when depending on chill. Liquid Extract, 1=1 of herb. *Dose.* 20 to 60 minims. Tincture, 1 in 10 of proof spirit. *Dose.*—1 to 2 drachms. *Senecin* is a dry extractive. Two alkaloids, ℗Senecionine, $C_{16}H_{25}NO_6$ (?) =327·288 and ℗Senecine are contained. Excellent in gastralgia and dyspepsia.

Mistura Senecionis Composita. A proprietary combination of Senecio, Hydrastis, Pulsatilla and aromatics for use in amenorrhœa, dysmenorrhœa and menorrhagia. A general uterine and nervine tonic.

Senecio latifolius.—Closely related to the common groundsel (*S. Vulgaris*). This and various other species induce fatal poisoning in cattle and horses —hepatic cirrhosis—in South Africa, Canada, and New Zealand.

Two new alkaloids isolated.—℗Senecifoline $C_{18}H_{27}O_8N$=382·448 M.pt. 194° C. and ℗Senecifolidine $C_{18}H_{25}O_7N$=385·314 M.pt. 212°. The former has been reported on by Cushny as being poisonous to animals. The plant is thought to be responsible for ' Molteno disease ' in cattle in S. Africa.

Senega (*Off.*), U.S. Dried root of *Polygala senega* (*Polygalaceæ*). An expectorant, contains Senegin. **Infusion** 1 in 20, Concentrated Solution 1 in 2 (B.P. '98). **Fluidextract**, U.S., 1=1. *Dose.*—15 minims. The alkali contained forms soluble compounds with the pectin principles in the root thus preventing gelatinisation (Caspari). **Syrup**, U.S.—Fluidextract 1, Simple Syrup to 5. The concentrated infusion of commerce is apt to deposit, owing to action of enyzmes; less likely to if made with a little alkali. **Polygalæ Radix, P. Belg.**, is the same. Fluidextract P. Belg. yields 25% solid matter. **Tincture** (*Off* and B.P '98) 1 in 5 Alcohol 60%.

Infusum Polygalæ Compositum. Dose.—½ to 1 ounce. Senega 10, boiling water 165, potassium iodide 5, paregoric 20, lobelia tincture 10. In use on the Continent.

Tisane de Polygala (Root)—(Fr. Cx.), 1 in 100 boiling water; infuse ½ hour.

Senna (*Off.*). The dried leaflets of either *Cassia acutifolia* (Alexandrian) or *C. angustifolia* (East Indian or Tinnevelly) (*Leguminosæ*). Activity due to Cathartic Acid. Constituents are Emodin (Tri-oxy-methyl-anthraquinone) Chrysophanic Acid and Gluco-sennin, etc. The **legumes or fruit, Sennæ Fructus** *Off.*, of both these varieties are in use. These are stronger than the leaves.—Tschirch. Experience has shown that the legumes are more active if *green.*—W. H. M. With aid of radio-graphic pictures it has been shown that Senna (infusion) acts only on the colon (peristalsis of). It has little or no action on peristalsis of the small intestine and stomach.

Confectio Sennæ (*Off.*).—*Syn.* Lenitive Electuary. *Dose.*—60 to 120 grains. Contains Senna 10% with Coriander, Figs, Tamarind, Cassia Pulp, Prunes, Extract of Liquorice, Sugar and Coriander. The use of 0·5% Coriander Oil instead of fruit would prevent grittiness in taste. **Confectio Sennæ et Piperis L.H.** Equal parts of Confection of Senna and Confection of Pepper. (*Off*). **Elixir Sennæ,** B.P.C. 1901. *Syn.* Liquor Sennæ Dulcis. *Dose.*—1 to 3 drachms. In this preparation the Cathartic Acid, not being subjected to long exposure to heat, is preserved from oxidation; **Cathartic Acid** is sometimes prescribed in doses of 4 to 8 grains in pills but is unstable. **Extractum Sennæ (Leguminum) Liquidum,** B.P.C. *Dose.*—1 to 2 drachms. Strength 1 = 1. R. Stockman concluded by comparing effects of preparations from the whole fruit, from the *pericarp freed from seeds* and from the uncrushed seeds that the second is best.—B.M.J. ii./15,128. **Elixir Sennæ Leguminum,** *Martindale. Dose.*—1 to 3 drachms, is prepared, as Elixir Sennæ, B.P.C. 1901, using legumes instead of leaves. **Mistura Sennæ Composita.**—*Syn.* Black Draught (*Off.*). *Dose.*—1 to 2 ounces. **Syrupus Sennæ** (*Off.*). *Dose.*—½ to 2 drachms. 1 drachm = ½ drachm of leaves approx.

Tinctura Sennæ Composita (*Off.*). *Dose.*—½ to 1 drachm repeated, 2 to 4 drachms for a single dose. Senna 1 in 5, with carminatives. **Tinctura Sennæ Leguminum.** The same strength as above using legumes in place of leaves.

Serpentariæ Rhizoma (*Off.*), U.S. *Average dose.*—15 grains (**1·0 Gm.**). Dried rhizome and roots of *Aristolochia Serpentaria* (*Virginia Serpentary*) or of *A. reticulata* (Texas *Serpentary*) (*Aristolochiaceæ*). Bitter tonic. Infusion (B.P. '98), 1 in 20, Concentrated Solution 1 in 2 (B.P. '98), Tincture (*Off.*), 1 in 5, now 60% Alcohol, was 70%. **Liquid Extract**, 1=1 Hydro-alcoholic. *Dose.*—5 to 15 minims. **Tincture**, U.S., 1 in 5 of Alcohol and Water in proportion of 65 and 35.

Shellac.—A resinous substance formed by a scale insect, *Tachardia Lacca* (fam. *Coccidæ*, ord. *Hemiptera*), which lives on a large number of trees, *e.g.*, *Butea frondosa*, *Ficus religiosa*, *Schleichera trijuga*, *Shorearobusta* (Wild Lac). The plants specially cultivated for Lac are *Acacia arabica* and *Cajanus indicus*. The red dye or lake washed out in the process of manufacture is now no longer a commercial article. A small proportion of common resin and powdered orpiment, and necessary colours for decorative work added. Treatise on chemistry of shellac.—P.J. ii./05,653.

Simaruba officinalis (*Simarubaceæ*).—*Syn.* MOUNTAIN DAMSON. *Dose.*—15 to 30 grains. Infusion 15 grains to 1 ounce in boiling water (infuse 15 minutes). *Dose.*—1 ounce. Has bitter taste, is astringent, and useful in dysentery. Contains (*a*) a colourless crystalline bitter glucoside $C_{22}H_{30}O_9$ (*b*) a colourless crystalline bitter principle, (*c*) yellow resin, (*d*) grown resin.—**Decoctum Simarubæ et Punicæ Granati.**—Add Simaruba Bark, Pomegranate fruit rind and Gum Arabic of each 15 Gm. to a litre of water and boil down to ½ litre. *Dose.*—30 Cc. three or four times daily. Cures dysentery rapidly. (Egypt).—Ph. Notes. The quantities and the ingredients have been varied from time to time. The Ministry of Health replaced Cinnamon for the Acacia.—C.D. 1920,1320. See also Mar. 26, 1921,442.

For *E. Histolytica* carriers.—*Dose* of ½ to 2 handfuls of pieces of the bark cut into ¼ inch lengths given in 1 pint drinks gave some success.—S. Shepheard and D. G. Lillie, L. i./18,501.

Solanum Carolinense.—Horse-nettle. A native of Southern U.S. A liquid extract 1 = 1 is employed in epilepsy. *Dose*, 15 to 60 minims.—H.

Solanum Dulcamara (*Caules Dulcamaræ*, P. Austr.) (*Solanaceæ*).—Woody Nightshade. Bittersweet. The dried herb is employed. Sedative analgesic. Ⓟ**Extractum Dulcamaræ**, P. Austr.—An aqueous extract inspissated and mixed with equal amount of acacia, and powdered. Description of, and of its poisonous characters, also of *S. Nigrum*.—E. M. Holmes, P.J. ii./15,524.

Solanum Nigrum.—Black or garden Night-shade. The leaves are said to be eaten boiled in the Isles of France and Bourbon and Hawaii Islands.

The Wonderberry stated to be from a luxuriant form or hybrid of Solanum Nigrum and to be edible. The berries of S. Nigrum contain 0·3% of *Solanine*. Tomatoes also contain this alkaloid. For those desirous of eating the berries (which should be *cooked*) use the cultivated wonderberry only. In China, India, and Brazil, the plant is taken as a diuretic for skin diseases and the juice for the enlargement of the liver.—P.J. ii./09,422.

Solanum Sodomæum.—The fruit of this plant is the apple of Sodom—when ripe is a pale yellow berry averaging 1 inch in diameter. Employed for destroying parasites in S.A., also for itch, ringworm, etc.—Juice of the fruit is extremely acid and bitter—it also contains Solanine.—Oliver.

Solanum Tuberosum. Extractum Solani Liquidum.—The concentrated juice of the potato preserved with glycerin has been used in synovitis, gout, lumbago, and rheumatism—as also Liniment. plaster and Ampoules.—Heaton C. Howard, L. i./14,1035; C.D. i./14,600.

Mosaic disease of tobacco leaf and other plants, leaf roll of the potato, and Botrytis of grapes compared with animal diseases. Leaf roll and mosaic are carried by aphides.—V. H. Blackman, B.M.J. ii./22,718.

Sorbus Aucuparia.—The Mountain Ash. A liquid extract is prepared, 1=1. *Dose.*—10 to 30 minims. A useful mild aperient: also has diuretic and emetic properties. Berries have sialogogue effect.—W. Johnson Smyth.—1924.

Sorghum. Chinese Sugar Cane. *Andropogon arundinaceus* (*Gramineæ*): Indigenous in China and India and cultivated in U.S. Proprietary preparations such as 'Lithiated Sorghum Comp.,' are popular in America in bladder affections.

Soya Bean.—*Glycine Hispida* (*Leguminosæ*). This bean is extensively cultivated in China and Japan for human consumption and latterly in America and Europe, chiefly as a forage crop, is eaten as a vegetable, in soups, sometimes pickled green, boiled and served cold with a sprinkling of Soy Sauce, and sometimes as a salad. A favourite method of preparing in the East is to boil until soft and place the resulting mass in a warm cellar until it ferments,—the resulting 'cheese' being known as 'Natto.'

Analysis of the bean calculated on water free basis, indicated 38·5% Protein and 20% fat. It is probably due to this large amount of easily assimilable Nitrogenous matter that the Chinese and other rice eating people require so little meat. It contains practically no Starch—the latter fact is said to be due to presence of a diastase in the bean capable of converting Starch formed, two-thirds into Sugar, one-third into Dextrin. Has been used as an addition to ordinary diabetic dietary,—the beans may easily replace the Gluten of bread,—causes reduction in percentage of sugar.—L. ii./10,1844. **Soy Flour** is even more serviceable, containing almost ⅓ more Protein than the bean, this being due to the removal of the fibrous hulls, which contain but little Protein.—B.M.J.E. i./11,80.

The protein of the Bean is being extensively used in connection with the treatment of diabetes and malnutrition. Soya Bean Meal from which it is made must be carefully examined for the toxic *Java Bean*.—F. W. Crossley Holland, P.J. ii./12,154. Soya Beans average 8 m.m. in length and 7 m.m. in breadth and 6 m.m. in thickness. They are roundly ovoid in shape and about 99% are pale yellow in colour—there being a few darker coloured, smaller and more elongated. Structure of the bean. Soya Bean Cake and Meal is enormously adulterated.—T. E. Wallis, C.D. ii./13,278; P.J. ii./13,120.

E. S. Peck states *Glycine Hispida* has been used in clinical experiments for the splitting up of Urea into Ammonium Carbonate.

Synthetic Milk has been made from the bean, but is not available commercially.

Animal tuberculosis. Sodium Soyate of no avail.—Sir L. Rogers, Pr. Aug. 1921, p. 98.

Soya Oil has Iodine value 121 to 123. Cowie found 131—C.D. i./10,66. For further characters see P.J. ii./11,407. *cf.* p. 619.

Spigelia U.S. *Sp. Marilandica* (*Loganiaceæ*), Indian Pink-root. *Average dose.*—60 grains. **Fluidextract**, U.S., 1=1 diluted Alcohol. *Average dose*, 1 drachm. Is employed for round and tapeworm, but is very potent.

Stannum, Sn = 118·7 Tin. The metal in finely powdered—preferably precipitated form. Given internally pure tin powder is probably not absorbed.

The metal in filings or powder was formerly used as a tæniacide, the destruction of the worm being due to the mechanical action of the foreign substance. From 4 to 15 Gm. were given suspended in syrups or made into an electuary and followed in from 3 to 6 hours by a brisk cathartic. Some of the salts (chiefly Chloride) are credited with vermicidal properties. In dose of 1/16 to ¼ grain the chloride has been used as an antispasmodic in chorea, epilepsy and other convulsive diseases.—N.S.D.

Stanni Oxidum (Stannic). $SnO_2 = 150·7$. Greyish white in colour. Used chiefly technically and as cosmetic diluted, *e.g.* as nail polish.

Distinguish from Stannous Oxide SnO which is dark grey—nearly black.

'Putty powder' is usually a mixture of tin and lead oxides or a stannate of lead, used for polishing glass.—Thorpe.

Jungman's Tooth Powder. Tin (Stannic) Oxide 15, precipitated chalk 60, soap 4, sugar 5. Flavour with mixed oils as for Blair's Tooth Powder; mix these first with the sugar.—H. Kraemer, J. Am. Ph. As., Jan. 1922, p. 43; P.J. i./22,263.

✱**Stannoxyl** (T.M. 379084) **Tablets.** Contain metal tin and oxide of tin.

Dose.—Four to eight, children two to four per diem at any hour in the day either in water or eaten dry. 2 Cc. ampoules for intramuscular injection, also Liquid for internal use are made.

Uses.—In staphylococcus infections—boils, carbuncles, furunculosis acne, styes. Effect stated to be remarkable; "cures" effected by the 5th or 6th day. Stated to be harmless and specific. Has also been suggested for use in anthrax.

It has been found that tin workers never suffer from boils. Powdered tin is a popular remedy for this complaint. In France Gregorie & Frouin tried doses of from 0·5 to 1 Gm. of powdered tin or oxide of tin in 50 cases

with cures in 5 to 14 days. Hudelo employed a mixture of 0·25 Gm. each pure tin and oxide of tin in cachet with success.—Jl. des Practiciens, June 2/17, *see* also Pr., Aug. 17.

Staphylococcal infections treated. Intravenous injection of chloride or hydroxide of tin in the rabbit 12 hours after intraperitoneal inoculation of virulent staphylococci retarded the death of the animal by several days. Furunculosis and acne well treated by tablets.—L. i./18,99.

Staphisagriæ Semina. *Off.* U.S. *Average dose* (U.S.).—1 grain.

The seeds of *Delphinium Staphisagria, Larkspur* (*Ranunculaceæ*) contain about 30% of oil and the white crystalline alkaloid. P1 **Delphina.** *Syn.*—**Delphinine.** $C_{22}H_{35}NO_6 = 409·398$. *Dose.*—$\frac{1}{64}$ grain increased to $\frac{1}{4}$ grain. Soluble in water, alcohol, and ether. This acts chiefly on the nervous system, first upon the bulb, next on the sympathetic. Said to be preferable to Aconitine, being less toxic. It acts on the heart, accelerating the cardiac movements, until finally arrest occurs in diastole.—L. ii./18,96. Given internally in toothache, neuralgia, earache, rheumatism, dropsy, and spasmodic asthma. Locally an alcoholic solution or ointment, containing 2 to 8%, causes tingling and transient redness like veratrine. Ⓟ One part of the Oil expressed from the seeds to 6 or 12 of perfumed olive or almond oil effectually kills pediculi of all kinds. Remove nits with a mixture of vinegar and proof spirit. Ⓟ **Unguentum** (*Off.* and B.P. '98). For scabies and to kill lice. Ⓟ **Fluidextract U.S.** 1=1 Hydro-alcoholic. *Average dose.*—1 minim.

Lotio Staphisagriæ. *Syn.* **Lotio pro Capite.** St. Barts. H.

Boil Stavesacre Seeds 1 drachm with Dilute Acetic Acid 24 minims and water 1 ounce 1 hour, cool, strain and add Quinine Sulphate 1 grain, Glycerin 24 minims, Oil of Sassafras 1 minim and make up to 1 ounce with water.

Stillingia Sylvatica U.S. (*Euphorbiaceæ*), Queen's Root.

Dose.—Average 30 grains. Contains Volatile Oil and Alkaloid (?). Large doses emetic, cathartic; small doses alterative. Is employed in scrofula, syphilis, jaundice, and for piles. **Fluidextract U.S.** 1 = 1. *Dose.*—30 minims. **Liquor Stillingiæ Compositus** is McDade's Succus Alterans for syphilis. *Dose.*—1 drachm.

Styrax Preparatus (*Off.* and B.P. '98). U.S. Thick brownish liquid compound obtained from *Liquidambar orientalis* (*Hamamelidaceæ*). Contains Cinnamyl Cinnamate (Styracin) and other Cinnamic Acid Compounds, together with a large proportion of Storesin, $C_{36}H_{55}(OH)_3 = 538·644$. *Off.* requires 20% Cinnamic Acid. Ointments of 20% are used in parasitic skin affections.

Storax of late years has been impoverished. A concentrated Essence of Storax (stated to be 50 times as strong as natural Storax and representing the true odor of Storax) is said to be prepared from the crude drug before placing on the market. Cinnamic Alcohol is also abstracted and used as a perfume for Soaps, etc.,—the natural Alcohol being far more fragrant than the Artificial, which is, of course, cheaper.—P.J. ii./11,6.

Phenyl-propyl Alcohol. *Syn.* Hydrocinnamyl Alcohol occurs in Storax as a Cinnamic Acid ester. It is a thick colourless oil (Sp. Gr. 1·007) with odour resembling Cinnamic Alcohol and hyacinths. It is used in hyacinth, narcissus, jonquil, and like perfumes.—P.R., July 5th, 1914, p. 189.

It came almost entirely from Turkey.—F. Ransom, C.D., Mar. 10/17.

Phenyl propyl acetate, allied to Styracin, is a synthetic substance used in manufacture of Synthetic perfumes and fruit essences.

Succinum.—Amber obtained from a fossil resin found in Germany. Oleum Succini. *Dose.*—1 to 5 minims. Useful in persistent hiccough, asthma, whooping cough and hysteria. Diluted with Olive Oil is rubbed upon rheumatic parts and upon the chest for bronchitis and pertussis.

B.P.C. has Amber Oil 1, Clove Oil 1, Olive Oil 2, as **Linimentum Succini Compositum.**

Genuine Oleum Succini Rectificatum has Sp. Gr. 0·950 approximately. Commercial **Oil of Amber** is almost entirely derived from the crude resin spirit obtained from colophony resin. It has Sp. Gr. 0·850 to 870. Like the genuine oil it consists chiefly of Terpines.—P.R., Jan., 1914, p. 17.

Artificial Amber. The most important constituents stated to be Phenol, Formaldehyde and Ammonia boiled together in a porcelain crucible. Glacial Acetic Acid, Sodium Sulphite, Soda and Hydrochloric Acid are added and the mixture boiled until resinous mass formed.—B.M.J.E. ii./21,45.

Sumbul Radix (B.P., 1898). *Syn.* Musk-root. Transverse slices of the

root of *Ferula Sumbul* (*Umbelliferæ*), but this is not collected now. Nervine sedative and antihysteric. Contains aromatic volatile oil, and resin. Supplies have been greatly hindered by the war. Tincture. 1 in 10. *Dose.* 30 to 60 minims. Extract Sumbul average yield is 15% (Caspari). **Fluid-extract,** U.S., 1=1 hydro-alcoholic. *Average dose,* 30 minims.

Symphytum officinale (*N.O. Boraginaceæ*).—The Common Comfrey plant with root boiled as a poultice has been used for cancerous tumours, also for hæmoptysis and kidney disease with blood in the urine, as a decoction or syrup. Root pulped was used to stiffen bandages for fractures.

According to investigation of C. J. Macalister and colleagues this plant, which has been used from Saxon days as a 'vulnerary herbal,' contains **Allantoin.** Titherley and Coppin found 0·6 to 0·8 % in the air dried material. See also A. Vogl, Y.B.P., 1919,165.

A strong (mucilaginous) **Infusion** of the root. *Syn.* **Mucilago Symphyti.** *Dose.*—1 to 2 ounces. Comfrey Root in coarse powder 1, Boiling Water 20—infuse 20 minutes, strain, cool, and add Chloroform 1 in 500. Applied to an ulcer measuring 3 by 4 inches involving the skin and deeper structures over the upper thorax, for about a week, cleaned it and produced a distinct growth of epithelium from the margins.

Concentrated Infusion.—*Dose.*—2 to 4 drachms. Suitable for dilution 1 with 3 of water. **Liquid Extract.** *Dose.*—2 to 4 drachms 1 in 4 by extracting the drug in coarse powder with water, and preserving with 20% of 90% alcohol. **Dry Extract.** *Dose.*—5 to 10 grains is prepared by extracting the drug with water at about 65° C. and evaporating and powdering. **Elixir Symphyti.** *Dose.*—½ to 2 drachms diluted is also made for internal use, *e.g.*, for the treatment of hæmoptysis.

The Liquid Extract (*Aqueous* extraction would appear to be best) from the root applied on lint to saturation has been found useful to cure old ulcers which resisted other treatment. The nightly application of the Infusion was found to be the only remedy for pruritus ani in a case where sleep was prevented for weeks together.

Internal use of the **Infusion** satisfactory in gastralgia,—eases pain of gastric ulcer,—indeed the internal use is more wonderful than its effect in external application,—promotes the growth of new mucous tissue.—W. Bramwell, B.M.J. i./12,12.

A decoction of Comfrey (or Infusion) is an old remedy for bad coughs and weak chests. It is very soothing.—B.M.J. i./15,748. Scraped and pulped up the root is considered soothing to sore and broken parts of the body—B.M.J. i./12,102. This plant and *S. tuberosum* have both the same properties, resembling the COMMON BORAGE, BORAGO OFFICINALIS, *cf.* Tisanes, in many respects, both yielding Allantoin-containing infusions.—B.M.J. i./12,336, (Historical Notes—Prosper H. Marsden). *Ibid.*, p. 344, 393.

Allantoin.—$C_4H_6N_4O_3$ = 158·10. *Dose* of Saturated Solution (0·3 to 0·4%) ½ to 1 ounce three or four times daily. *Soluble* in water 1 in 260, in alcohol 90% 1 in 2,360, in alcohol 80% 1 in 1,700, in absolute alcohol 1 in 5,000 (all by experiment). This substance is obtainable in brilliant crystals with indefinite melting point, *i.e.*, decomposes. *Manufacture.*—May be prepared artificially by oxidation of Uric Acid in Alkaline Solution in the cold.

Allantoin is deemed a cell proliferant and is used locally as the Saturated Solution (*v.* above). It is an interesting fact that Allantoin is present both in animals and in plants, *e.g.*, in the fetal allantoic fluid (hence the name), also in the urine of pregnant women, and in small amounts in normal urine. It may be derived in the latter from vegetable foods,—in the healthy individual it appears to come from these. It may pass practically unchanged through the human being. It is present in bread, French beans and green peas. Although the Allantoin in the human embryo may be a fœtal waste product, in the economics of nature it may have a function to perform regarding cell multiplication, especially as it is not at once eliminated from the maternal circulation,—it occurs in milk,—the food of the rapidly growing young organism. Presence of Allantoin in wheat germ has been confirmed by Power.—P.J. ii./13,117.

Allantoin Dressing (Saturated Solution above) has been found useful in chronic varicose ulcers, boils, etc., and may prove of use as a cell proliferant when skin grafting has been performed.—B.M.J. i./12,10.

The Dressing is applied on absorbent lint or a few folds of gauze and covered with gutta percha tissue—it should be renewed frequently during the day.

Allantoin used to burns. It not only stimulates epithelial growth but 'cleans up' sloughing surfaces in a remarkable manner.—B.M.J. i./12,102.

Allantoin is not a poisonous antiseptic. It favours rather than inhibits the growth of organisms—demonstrated by experiments on simple forms of life from sea water. Further *B. Coli*, *Staphylococci*, *Streptococci* and *Tubercle Bacilli* are not affected by presence of 0·2% in the culture medium. In Comfrey rhizome it is abundant in the spring but almost absent in the summer (June).

Allantoin (15 minims of 0·4% solution) injected into hyacinth bulbs in process of growth causes them to flower more rapidly. Experiments on other plants proved that Allantoin can be used by vegetable cells in connection with their proliferation—as with certain animal cells. Allantoin is a dangerous substance to give or to apply in *malignant* cases. It has in some way to do with the activities of **Nucleic Acid,** which contains four Metaphosphoric Acid radicles and Purine and Pyramidine groups. Both of these yield Uric Acid in their metabolism and Uric Acid on oxidation yields Allantoin. Cellular resistance may depend on efficient building up of Nucleic Acid.

Metaphosphoric Acid in conjunction with Allantoin has been tried in tubercular sinuses and skin affections internally and hypodermically with promising result.—C. J. Macalister, B.M.J. ii./12,702.

Allantoin 0·5% Alcoholic Solutions applied daily to wounds—improved time of epidermization.—B.M.J. ii./13,731.

Allantoin Ointment 0·3% in Vaseline suggested for use for bedsores.—W. H. M.

Tamarindus Indica (*Leguminosæ*). *Dose.*—1 to 8 drachms. The preserved fruit contains Tartaric Acid and Potassium Acid Tartrate in considerable quantity, and added sugar about 30%. It is also imported pressed into a solid mass as pulp.

Pastilli Tamarindorum Compositi. P. Aus. Add. VIII. **'Hindu Dates.'**—Tamarind Pulp 10, Senna in fine powder 3, Sugar 5, Wheat Starch 1. Mix on water bath. Divide into Pastilles weighing about 40 grains each and cover with chocolate. Useful laxatives for children and invalids.

Tamus Communis. (*Dioscoriaceæ*). Black Byrony (found chiefly in Mediterranean region). **Tincture** of this, applied with brush, has been found useful in chilblains (unbroken), in conjunction with Calcium Lactate internally. The berries are said to be an irritant poison. Description of.—E. M. Holmes, P.J. ii./15,358.

Tanacetum, Tansy.—Leaves and tops of *Tanacetum vulgare.* An aromatic bitter used as a vermifuge, but may cause dangerous irritation. **Liquid Extract,** 1=1. *Dose.*—15 to 30 minims.

Taraxacum officinale (*Compositæ*) (*Off.* and B.P. '98),. *Dose,* 30 to 120 grains. Its preparations are: **Extractum** from fresh root. *Dose.*—5 to 15 grains. **Liquid extract** (B.P. '98), 1=1. *Dose.*—½ to 2 dr. *Flavoring.*—Syl Limonis, Syl Cinnamomi, Syrupus Zingiberis. **Succus,** (*Off.*) 3 of expressed juice with 1 of alcohol 90%. *Dose.*—1 to 2 dr. **Taraxacum Cocoa.** Laxative suitable for children who are bilious. *Dose.*—One tablespoonful to be taken in the morning.

Malignant disease has been treated by 2 drachm doses of Liquid extract.—B.M.J. i.13,1256.

Choline is contained in the root.—F. B. Power, P.J. ii./12,694.

Facts and fancies about Dandelion, and other Compositæ from the botanical aspect.—J. Small, P.J. ii./16,157.

Taxus Baccata.—The Yew. [P1] Taxine, $C_{37}H_{51}NO_{10}$ = 669·601, an alkaloid, is a constituent. White crystals soluble in alcohol and ether. *Dose.*—$\frac{1}{100}$ to $\frac{1}{60}$ grain. Is said to have an action on circulation.—Proc. Chem. Soc., Vol. 18, No. 253.

The berries are poisonous. Description.—E. M. Holmes, P.J. ii./15,638,641. Poison probably obtained from Yewberries was used on arrow heads by the Greeks of old.—Sir C. Ballance, L. i./20,5.

Terebinthina Chia, P.L.—*Dose.*—5 to 10 grains. Oleoresin from trunk of *Pistacia Terebinthus*; was used for cancer of the female generative organs.

Teucrium Scordium (*Labiatæ*).—Water Germander. *Dose.*—10 to 20 grains. Contains a volatile oil and a bitter principle. Given for hæmorrhoids and pruritus ani. Diaphoretic; tonic for scrofula, gout, dropsy, flatulence. Liquid Extract. *Dose.*—½ to 1 drachm. (P) **Electuaire Diascordium, 'Diascordium,'** FR. CX. Water-Germander Herb 50, Red Rose petals 20, Bistort Root 10, Gentian 10, Tormentilla 10, Barberry Berries 10, Ginger 5.

Long Pepper 5, Canella 20, Siam Benzoin 10, Galbanum 10, Gum Arabic 10, Carbonate of Iron 20, Opium Extract 5, Mellitum Rosæ—Mellité de Rose Rouge 650, Malaga Wine 100—by weight throughout. 15 grains of this Electuary contains 0·006 Gm. (about $\frac{1}{10}$ grain) of Opium Extract.

Thuja Occidentalis.—Arbor Vitæ. A Tincture is prepared, of the dried young tops in 10 of 70% alcohol. *Dose.*—2 to 5 minims (0·12 to 0·3 Cc). Thuja has an irritating action on the skin, and has been employed to remove warts and fungoid granulations from ulcers; internally for amenorrhœa, pulmonary catarrh, and worms. ✱**Ecthol.** *Dose.*—1 drachm well diluted. Is said to contain *Thuja occidentalis* and *Echinacea angustifolia*. Employed in all forms of septic conditions, *e.g.*, blood poisoning, typhoid, erysipelas, diphtheria, acne, etc.; also locally for any kind of pustular formation; as wound dressing, diluted with 2 to 10 times volume of boiled water.

Thymus Vulgaris (*Labiatae*). Thyme. **Extractum Thymi Liquidum, P. Helv.** *Dose.*—5 to 30 minims (**0·3 to 2 Cc.**). Moisten Thyme 100 with a mixture of Glycerin 10, Alcohol 20 and Water 20. Percolate with a mixture of Alcohol 1 and Water 3, and reserve the first 85. Percolate further, recover the alcohol, and evaporate second percolate to soft extract and dissolve in reserve so as to produce 100. *Flavoring.*—Syl or Glyl Pini, or Lavandulæ, Syrupus Aurantii. **Pertussin,** a proprietary article for whooping cough, contains this drug. *Dose.*—1 to 4 drachms repeated. **Syrupus Thymi** (Ph. Notes) Liquid Extract of Thyme 1, Syrup 7 has similar properties and dose. J. Pollard finds this preparation with a small dose of Diamorphine a virtual specific for hacking cough. The following are two useful mild sedative preparations for cough: Ⓟ**Linctus Thymi et Diaphorm.** *Dose.*—1 drachm as required. Diamorphine $\frac{1}{48}$ grain, Syrup of Thyme to 1 drachm. Ⓟ**Elixir Thymi de Diaphorm.** *Dose.*—1 drachm as required. Diamorphine $\frac{1}{48}$ grain Compound Tincture of Lavender 15 minims ,Syrup of Thyme to 1 drachm.

Oleum Thymi, U.S. *Dose.*—3 minims. Distilled from the fresh herb—*cf.* Origanum Majorana. It contains 25% Phenols (Thymol and Carvacrol).

"Red" Thyme Oil on rectifying is converted into White Thyme Oil. To prevent this turning red again it is frequently distilled with a large amount of Turpentine, or indeed the white variety is simply a dilution with Turpentine. This adulteration can be detected by the fact that the Phenol content, Solubility in Alcohol and Sp. Gr. are all lowered.—*cf.* P.J. ii./10,760.

Oil of Red Thyme is obtained from the fresh herb, Thymus Vulgaris, which is grown principally in Southern France. Spanish Thyme Oil is probably derived from a species of Origanum, but has not been definitely ascertained. Characters: Sp. Gr. 0·905 to 0·930, Phenols 20 to 45%; constituents: Thymol and Carvacrol, *l*-pinene, Borneol and Linalol.—C T. Bennett, P.R., Nov., '13, 389.

Tragopogon Pratense (*Compositæ*). 'Goat's Beard.'—Poisoning by seeds of, called 'Gipsy Nuts' has occurred. Give Emetic: Strychnine *hypod.*

Ulmus fulva (*Ulmaceæ*).—The SLIPPERY ELM grows in America (*Ulmus campestris* is common in Europe). The inner bark of fibrous texture has a highly mucilaginous taste; in powder is much used as a demulcent. It should be free from starch. Ten grains shaken with an ounce of water should form a thick jelly-like fawn coloured mass. *Decoction.*—1 in 8. *Dose.*—2 to 4 ounces. A mucilage 1 in 16⅔ was Official in U S. **Glycogelatin Pastils** are prepared containing 2 grains

Unoline. A salt prepared from charcoal with addition of fruit juices and an antiseptic, forms a useful acid tooth paste termed Willowcine.—W. J. Henson, B.M.J. i./21,408.

Urginea.—Indian Squill. *U. indica* and *Scilla indica* are now *Off.* and preparations Acetum, Pilula Ipecacuanhæ cum Urginea, Pilula Composita, Oxymel Urgineæ, Syrupus and Tinctura correspond with Squill preparations for use in the Tropics.

Uzara Preparations. For dysentery. For details see Edn XVI., p. 854, and Edn. XVII, Vol. II., p. 151.

Vanadium, (V=51).—Meta-Vanadic Acid, HVO_3=100·008 and Sodium Meta-Vandate, $NaVO_3$=122. Of these the last has been used in chlorisis, phthisis, and rheumatism as tonics and antiseptic.—*Dose.* 1/32 grain or 1/5 the quantity injected hypodermically. Soluble in water, 2 in 1.; decomposes in the presence of organic matter. **Vanadine.**—A liquid preparation of French manufacture, said to contain a vanadium salt and sodium chloride. Is used for gastralgia and dyspepsia.

Vanillin. Methylprotocatechuic Aldehyde. $C_6H_3OH.OCH_3.COH$. 4 : 3 : 1 = 150·104. Occurs in white acicular crystals, having a strong odour if obtained from *Vanilla planifolia* (*Orchidaceæ*), U.S. (the cured full-grown but immature fruit), but is mostly made synthetically from guaiacol or from eugenol or from coniferine, a glucoside obtained from coniferous woods. Soluble in alcohol, ether, and oils, sparingly so in water. Use suggested in atonic dyspepsia as an excito-motor stimulant. For employment as test, *vide Vol. II.* **Solutio Vanillin.**—Vanillin 80 grains, Alcohol 90% to 1 ounce. For ordinary purposes ½ drachm will flavour a pint of medicine. **Essence of Vanilla** 1 in 8 by macerating Vanilla Beans 1 finely ground with Sand 1, in a mixture of Water 2, and Alcohol 90% 6. From this are prepared **Glyl** and **Syl Vanillæ** *q.v.*

Marked skin irritation caused by local use of Vanilla Essence in a hair wash. Relieved by Mercuric Iodide in Spirit.—Leggett, B.M.J. i./14,1351.

Elixir Vanillini Compositum: N.F. *Dose.*—½ to 1 drachm. Mix Compound Spirit of Vanillin 20, with Alcohol 80, add Glycerin 25, then Syrup 300 and Water 550 in several portions with shaking. Then Tincture of Caramel 20 (Caramel 1 Alcohol 2·5, Water to 10). Finally Water to 1000. Filter with Kieselguhr.

Spiritus Vanillini Compositus N.F. *Dose.*—½ to 1 drachm, Vanillin 40, Oil of Orange 10, Oil of Cardamom 2, Oil of Cinnamon 2, are dissolved in a sufficiency of Alcohol to make 200. Store in tightly stoppered amber bottles away from light.

ℙ **Veratrina** (B.P. 1898). U.S. *Dose.*—$\frac{1}{64}$ to $\frac{1}{16}$ grain. A mixture of alkaloids, chiefly amorphous veratrine and crystalline Cevadine, from Cevadilla seeds—*Schœnocaulon* (*Asagræa*) *officinale* (*Liliaceæ*)—in greyish white masses, taste bitter and acrid. Nearly insoluble in water; *soluble* 1 in 3 of 90% alcohol; 1 in 6 of ether. It is used as an antipyretic *with caution!* and circulatory sedative in fevers and acute inflammations—resembles Aconitine in its general effects. Large doses cause vomiting and purging; sometimes for neuralgia, spasm, rheumatism and gout. Externally in the form of ointment for neuralgic pains and swellings.

Caution. Its sternutatory properties are most marked.

℗ **Oleatum Veratrinæ.** Veratrine 2, Oleic Acid (by weight) 50, Olive Oil to 100. Useful for neuralgia. Stronger, *e.g.* 10% is employed as a pigment.

℗ **Unguentum Veratrinæ** (B.P., '98). Veratrine 1, Oleic Acid (by weight) 4 (1 grain = 2 drops); warm gently to dissolve, add Lard 45. Prolonged use may produce rash. Useful for neuralgia and sciatica, rubbed in twice daily.

℗ **Acetum Cevadillæ, E.** Cevadilla Seeds crushed 10, Methylated Spirit 10, Acetic Acid 18, Water 72. Macerate 7 days. For external use. The Germans employed Veratrine extracted from Cevadilla for use in tear shells.—G. Sharp, P.J. i./16,620.

Veratrole, Arsinic Acids derivatives from.—R. G. Fargher, J.C.S., July, 20,865.

Veratri Viridis Rhizoma.—Green Hellebore Rhizome.

Dose, in powder.—1 to 5 grains.

The dried rhizome and rootlets of *Veratrum viride* (*Liliaceæ*), imported from and official in U.S. It contains protoveratrine and other alkaloids. Its powder excites sneezing. *V. Album* is similar. A powerful Cardiac, arterial, and nervous sedative. In puerperal eclampsia small doses hypodermically said to be of value, giving chloroform until the veratrum takes effect.

Tinctura. B.P.C. 1 in 10 of 90%.—B.P. 85, 1 in 5. *Dose.*—5 to 15 minims. The U.S. Tincture (*average dose,* 15 minims) is 1 in 10 Alcohol 94·9% volume.

Fluidextract U.S. Hydro-alcoholic 1 = 1. *Average dose.*—1½ minims.

High arterial tension in eclampsia, a common and dangerous condition, can be reduced by 20 minim doses hypodermically of a tincture every hour until the pulse is reduced to 60 beats per minute. When pulse begins to rise 10 to 15 minims every hour until it again falls to 60.—B.M.J. ii./12,1127.

Veratrone.—A proprietary preparation 1 Cc. of which is equivalent to 20 minims of tincture. In eclampsia.—B.M.J. i./14,141.

The rhizome of *V. album* (*Liliaceæ*) *White Hellebore,* emetic, purgative and parasiticide, contains alkaloids. Similar to those of *V. Viride.*

Both the above must be distinguished from **Helleborus Niger** (*Ranunculaceæ*), or **Christmas Rose,** which is purgative and emmenagogue and has strong sternutatory properties, and is now little used.

Verbascum Thapsus P. Dan. Great Mullein (*Scrophulariaceæ*). Has

been used in phthisis ; has anodyne demulcent and diuretic properties. Tincture 1 in 8, Alcohol 60%. *Dose.*—20 to 60 minims.

Verbena Officinalis.—Vervain. Has been used as a remedy for epilepsy.

Verbena triphylla. Cultivated in Southern Europe, is used as a febrifuge and sedative in the form of an infusion, and enters into the composition of certain tonic wines. The leaves yield about 0·19% of an oil resembling Lemon-grass Oil, with which it is often adulterated.—P.R., July 23, 1914. p. 240.

✱ **Vescettes.** (T.M. 260597). Vescettes are effervescent Salts in compressed form. They are convenient and portable (for various formulæ see Index) and are directed to be crushed and added to a small quantity of water preferably warm—forming a palatable mode of administering drugs of unpleasant taste. Their effervescence aids assimilation and toleration.

Viburnum, BLACK HAW (*Off.* and U.S.). Bark of *V. prunifolium* (*Caprifoliaceæ*) (or *V. Lentago,* U.S.). Antispasmodic, diuretic, nervine tonic. For dysmenorrhœa and threatened abortion. Extractum Liquidum (*Off.*). *Dose.*—1 to 2 drachms. 1=1 Alcohol 70%. *Flavoring.*—Syl Menth. Pip., Syl Lavand., Syrup Aurant. Tincture 1 in 2 Alcohol 60%. *Dose.*— 2 to 4 drachms.—L. ii./09,204. Elixir Viburni prunifolii, B.P.C. Liquid Extract 12·5, Compound Tincture of Cardamons 7·5, Aromatic Elixir to 100. Compound Elixir, B.P.C. is Liquid Extract of Viburnum 50, Dry Extract of Hydrastis 1·75, Oil of Coriander 0·5, Oil of Caraway 0·5, Glycerin to 100.

Vinca major—Great Periwinkle Herb. Is astringent, and has been used for menorrhagia. Infusion, 1 in 10. *Dose.*—A wineglassful frequently. Liquid extract, 1 to 2 drachms.

Mr. E. Whyte, Native Registration Officer at Greyville, Natal, a diabetic sufferer, relates (Oct. 1923) that after taking a decoction of the fresh leaves for 3 months his health improved and at the end of 10 months he was cured. Other similar cases are recorded ; in conjunction with dieting, it is said to be curative. *Directions* are : ' Boil 30 leaves in 3 cups (say 15 ounces) of water slowly ; take one cup three times daily.'

Viola Odorata.—Has been used in cancer both internally and externally. **A liquid extract** is prepared (2=1 of fresh leaves). *Dose.*—Internally, 1 teaspoonful. May also be rubbed in locally. A fomentation of the leaves is also said to have given relief. The various species of Viola have similar properties. The herbaceous parts of the plant are mucilaginous, emollient, and slightly laxative. The root acts (in *dose* of 30 to 60 grains) as an emetic and cathartic. ' Princess of Wales ' violet leaves are preferred. Contains glucosides amounting to 5% of the fresh leaves to which activity is probably due. The leaves may be carefully dried at 50° C. and powdered. The powder (20% of the fresh leaves) for administration in cachet and for making infusions and poultices. **Liquor Violæ Glucosidi.** *Dose.*—½ ounce thrice daily. Is manufactured by macerating the fresh leaves two days in alcohol 90%, then percolating with alcohol to extract completely. Distil off most of the alcohol, and make up to volume with water (containing alcohol 30%) so that 1=1. Violet preparations have relieved the pain, fetor, and size of malignant growths. No alkaloid has been detected nor Salicylic Acid.

Contra-indicated in feeble heart and where the liquor causes dyspepsia. Give hypodermically ½ to 1 drachm twice daily. **Syrupus Violæ.**—Macerate fresh flowers 2 in alcohol 90% 1, 8 hours, press and add water to 2, filter and add syrup 18. **Ionone.**—Artificial violet perfume is made by action of alkalis on a mixture of Citral and Acetone in presence of water. It has composition $C_{13}H_{20}O$, and is an oily liquid with Sp. Gr. 0·935. It contains the two isomers *a*-ionone (Sp. Gr. 0.932), having the sweeter odour, resembling Orris and *b*-ionone (Sp. Gr. 0·946) which more resembles the fresh violet flower.—P.R., July 5, 1914, p. 184.

Viola Tricolor.—Flowering plant of Wild Pansy. Is stated to contain Glucosides similar to the above. Is used externally as an ointment, and a poultice. *Dose.*—10 to 60 grains in infusion. An infusion in milk 1 in 10. Very useful in acne vulgaris. The plant contains Salicylic Acid, and Viola quercitrin $C_{27}H_{30}O_{16},2H_2O=646{\cdot}407$.

Viscum album.—Mistletoe (*Loranthaceæ*). The berries are said to be emetic and purgative. The plant contains Viscin, a kind of birdlime—Japanese Birdlime, which has been used as a plaster and is largely employed for making sticky fly-papers. Has been given for epilepsy and hysteria. *Dose,* in powder 10 to 60 grains. Recommended for chorea.—W. W. W.

In albuminuria said to be of value (1908). Solid extract used, 0·1 to 0·3 Gm. per diem ; acting best when blood pressure and tension is high.

✱ **Guipsine** (T.M. 310351) **Pills** stated to contain 0·05 Gm. of active principles of this drug. Fresh mistletoe contains a volatile alkaloid and two saponins and emetic and cathartic resin. Guipsine is stated to contain all these excepting the resins. According to the B.M.J. 1911 it lowers arterial tension due to a central vaso-motor action, and is without any depressing action on the heart itself. For use in arterio-sclerosis.

Vitex Peduncularis.—An Indian forest plant. In malaria and blackwater fever, infusion of leaves 1 oz. in 40 ozs., this forming a dose spread over 24 hours. Frequently made stronger, *e.g.* 1 in 10. Successful.—J. C. S. Vaughan, B.M.J. i./21,186.

Xanthoxylum. U.S.—Dried bark of *Xanthoxylum Americanum* (Miller), Northern Prickly Ash; or of *X. Clava-Herculis* (Linné), small (Southern) Prickly Ash (N.O., *Rutaceæ*). Fluidextractum 1 = 1. *Average dose.*—30 minims. Hydro-alcoholic. Stimulant, employed in rheumatism.

Xanthoxylum Capense. *Syn.* DUTCH, PAARDE PRAM. Knob-wood; Wild Cardamom. The Kaffirs use an infusion of the root bark. Draughts of this infusion are taken whilst eating the flesh of animals that have died from anthrax. In these conditions Dr. W. Anderson Soga states: "So far as I know no death has resulted from eating of such deadly carrion."—C.D. i./10,115.

X. Seneyalense, a Gold Coast drug, contains an alkaloid Artarine which produces muscular irritation and physiological disturbances similar to those of Veratrine. The bark has stimulant properties and is used locally in rheumatic affections and intestinal troubles.—L. ii./16,812.

Yerba Santa (*Eriodictyon glutinosum* or *E. californicum*).—Leaves are aromatic and sweetish, often agglutinated together; they are stimulant in bronchitis, phthisis, and other catarrhal affections. Fluid extract, 10 to 40 minims. *E. californicum* is Official in U.S. FLUID EXTRACT 1=1. *Average dose*, 15 minims. Contains crystalline Eriodictionone $C_{15}H_7O(OCH_3).(OH)_4$.

P1 ✱ **Yohimbine** (T.M. 232617) **Hydrochloride**, $C_{22}H_{30}N_2O_4HCl(?)$ = 422·834. The salt of an alkaloid obtained from Yohimbe bark, *Pausinystalia Yohimba* (*Rubiaceæ*) is a reputed aphrodisiac. 1% solution in Alcohol. *Dose.*—5 to 15 minims. Yohimbe is used by the Cameroon natives. Yohimbine Hydrochloride $C_{22}H_{28}O_3N_2HCl$, M.pt. 287° C. Nitrate $C_{22}H_{28}O_3N_2HNO_3$, M.Pt. 276° C. The Nitrate is soluble 0·9% (=1 in 111) in cold water.

Manufacture.—According to Patent 11,647 of 1900 (expired 1914) the Yohimbehe bark is extracted with dilute Acetic Acid and the liquor precipitated with Sodium Carbonate and the alkaloidal base recrystallised from Alcohol. Melting point 234° C.

Ⓟ **Tablets** contain $\frac{1}{13}$ grain. *Dose.*—1 thrice daily; may be increased to five. It has erotic powers.—B.M.J.E. i./01,103; i./05,28.

If the internal administration not successful, injections of 7 to 15 minims (½ to 1 Cc.) of a 1% solution may be tried.

A few drops of a solution ½ to 1% strength act as an anæsthetic when applied to the cornea. There is no mydriasis, and the anæsthesia lasts for an hour.—L. i./05,1012. 25 Cc. of a 1% solution has been injected subcutaneously.—B.M.J.E. i./05,28.

True Yohimbe bark contains at least 4 alkaloids totalling 0·3 to 1·5%.—P.J. ii./07,783. History, botanical sources, chemistry, tests and characters of Yohimbe.—Prof. J. Small, P.J. i./22,283. Genuine Yohimbe Bark is from *Pausinystalia Yohimba*. Histological characters and reactions, *ibid.* 311.

We have had reported to us that after seven Tablets of Yohimbine gr. 1/13, a patient experienced a sense of heart failure, 'felt as if heart would burst,' fainting, cold sweats, severe frontal headache, great depression of spirits, muscular weakness, walked like an old man—had foreboding of being taken ill. No sickness or diarrhœa. Attack lasted about 12 hours before he felt right again after stopping Tablets. This occurred again in the same patient when he reverted to drug after two tablets.—C. W.

Experiments on bitches seem to show that Yohimbine possesses the property of affecting ovarian nutrition by inducing a constant supply of blood to the ovaries. Mammary secretion was also stimulated. When excessive doses are given nervous irritability is produced. Experiments abroad on male animals indicate a marked aphrodisiac effect.—P.J. ii./09,184.

Prior to the war Yohimbe Bark was exported from the Cameroons to

Germany. A plant in the French Congo also yields the alkaloid and has been worked up since in France. The Bark (from Togoland) has also been imported to Liverpool. Either it is carried from the Cameroons to Togoland or the Togo Bark is not identical. For further Botanical notes see C.D. '19,1103.

Yohimbine Comps. (Arsenate, methylarsinate, etc.).—J.S.C.A. i./1919,549.

Zingiber. (*Off.*). Dried rhizome (scraped) of *Z. officinale* (*Scitaminaceæ*). *Dose.*—5 to 15 grains. Must yield 5% to Alcohol and 8·5% to Water. P.G.V. has the rhizome not scraped. **Fluidextract.** U.S. 1 = 1, alcoholic. *Dose.*—15 minims. **Syrup** (*Off.*). *Dose.*—½ to 1 drachm. Ginger 1, Alcohol 90% *q.s.* to 2 by percolation, add Syrup *q.s.* to 40. **Pulvis Aromaticus U.S.** *Dose.*—15 grains. Saigon Cinnamon 35, Ginger 35, Cardamom, 15, Nutmeg 15. **Tinctura Carminativa,** B.P.C. *Dose.*—2 to 10 minims. Essence of Ginger 6·25 (B.P. 1885), Cardamom Seeds, bruised, 6·85, Oil of Cinnamon, Oil of Caraway and Oil of Clove of each 1·04. Macerate the Cardamoms in Alcohol (90%) 75 for a week, decant, express, and dissolve the oils in the mixed tinctures, adding Alcohol (90%) *q.s.* to 100. **Tinctura Zingiberis Fortior, Essence of Ginger, B.P.** 1885, Ginger 1, in Alcohol (90%) 2. *Dose.*—5 to 20 minims. **Tinctura Zingiberis** (*Off.*). *Dose.*—30 to 60 minims. 1 in 10 Alcohol 90%. **Gingerin.** *Dose.*—¼ to 1 grain. The treacle-like oleo-resin of ginger made by percolation with ether or acetone and subsequent evaporation. Added to purgative pills to prevent griping. **Gingerol** of Grier confirmed by A. Lapworth. It has been converted into a crystalline derivative and further broken down by the latter investigator into a crystalline pungent principle. Finally gingerol has been synthetised on these lines.—P.J. i./17,201. See also ii./17,172,205. **'Hippocras'** *Dose.*—As required. Ginger, Cloves, Mace, Nutmeg, Galangal, of each 1 drachm, Cinnamon 2 ounces, White Wine 1½ gallons, Sugar 40 ounces, Digest 3 days. Stomachic and antispasmodic.—From an old herbal. **Mistura Carminativa** *Dose.*—½ ounce (**15 Cc.**). Tincture of Ginger 3 drachms, Compound Tincture of Cardamoms 9 drachms, Tincture of Capsicum 1 drachm, Spirit of Ether 3 drachms, Spirit of Chloroform 1½ drachms, Peppermint Water to 6 ounces. A dose every 2 or 3 hours useful in dyspepsia.—Sir W. H. Willcox.

VACCINES AND ANTITOXINS.

One may define **Vaccine Therapy** as—"to exploit in the interest of infected tissues the unexercised immunising capacities of the uninfected tissues"—in other words, to stimulate the chemical machinery of the patient to elaborate the required specifically bacterio-tropic substances. In some infections, *e.g.* furunculosis and other staphylococcal infections, and in bronchitis and other infections of the respiratory tract due to the pneumococcus, the results have been striking, so that, apart from questions of dosage and methods of control, the method has practically passed beyond the stage of controversy in these conditions. In many other diseases, such as typhoid fever, gonococcal infections, septicæmia and endocarditis, encouraging observations are on record. Vaccines have given valuable results in the prophylaxis of disease. Sir A. E. Wright suggests that as each individual may possess a susceptibility to some special organism, Vaccine Therapy will in the future enable each to escape the consequences of this susceptibility by affording a protection.

With regard to the **Antitoxin Treatment** Behring showed that the toxins of the diphtheria bacillus when injected into a suitable animal effected an immunity, that the serum of this animal induced immunity to the disease when injected into another, and that it could be employed for treating the disease in the human body.

The antitoxins contained in this animal blood serum combine with the toxins in the blood and tissues of the sick person ; by so doing they *neutralise the power of the toxins*, and thus the human body is recuperated.

The Toxins of diphtheria and tetanus are extra-cellular " soluble " toxins excreted by the bacteria, found in the fluids in which they are cultivated. But in the case of typhoid and plague, the toxins are apparently inherent in the bacterial cell ; and anti-endotoxins are not readily produced.

This may account for the fact that antityphoid serum can only neutralise a small lethal dose of the typhoid bacillus, and possesses little curative effect.

The absence of success with the antityphoid and anticholera sera in man may be due to the fact that the " complement " in man is not met by an appropriate immune body in these sera. It has been suggested to employ in these diseases an injection of **Normal Horse Serum** at the time of administering the antitoxin so as to increase the amount of the complement (the serum must however be fresh).

ANTIBODIES.

Antibody is a substance found in the blood serum, resulting from the inoculation into the animal of a foreign *protein* termed its *antigen*. Thus, if a foreign protein, *e.g.*, egg albumen be injected, the blood serum acquires a new property, that of precipitating a solution of egg albumen, such as was used for the injection. Here the albumen is the antigen and the new property is assumed to be due to a new substance—an antibody called *precipitin*. Antibodies are always *specific*, for example, diphtheria toxin acting as an antigen leads to the production of diphtheria antitoxin which has no action on the toxin of tetanus. Antibodies may be classified according to effect produced on combining with corresponding antigen, thus :—

Antibody.	Antigen.	Action.
Antitoxin	Toxin	Neutralisation.
Precipitin	Coagulable Protein ..	Precipitation.
Agglutinin	Cells, bacteria, etc. ..	Clumping.
Cytolysin (including Bacteriolysin and Hæmolysin).	Cells, bacteria, etc. ..	Prepares cells, bacteria, etc., for solution by complement.
Opsonin	Cells, bacteria, etc. ..	Prepares cells, bacteria, etc., for ingestion by leucocytes.

It is not certain that opsonin should be classed as an antibody. Some, possibly all, the true antibodies may play the part of an opsonin.

Two substances are required for the lysis of the microbe—the so-called *immune body* produced during the injection treatment—the other known as the *complement* exists already in Normal Serum and is not elaborated in increased quantities by the injections. The immune body is supposed to possess two affinities, one of which binds it to the bacterium and the other satisfies itself by combining with the complement. The possession of this double affinity of the bacteriolysin is recognised in its name of amboceptor. It must be

regarded as an intermediary body which on being added to the bacteria during the process of immunisation gives the complement, existing already in the blood serum, the power of attacking them. The complement—not the immune body, effects the destruction of the bacteria.

In Serum treatment a substance is introduced into the patient's circulation which already contains the Antitoxin and which has the power of uniting with the toxin to form an inert substance—somewhat after the manner of an acid and base forming a salt. Contrast this with *Vaccine* treatment wherein the tissues of the body are stimulated to form the necessary antibodies for themselves.

Pleural effusion has been treated by autoserum therapy, *i.e.*, 1 Cc. of pleural effusion is withdrawn and injected immediately under the skin of the back. Repeated, if desired, as often as required. Diuresis and rapid absorption of the fluid follow. 14 out of 15 cases of serofibrinous and hæmorrhagic pleural effusion gave excellent results. Pyrexia was not found to be a contra-indication. The injection of pleural fluid probably stimulates formation of specific Antibodies.—B.M.J.E. ii./10,4.

Immunity may be (1) *Natural* where the organism is naturally insusceptible to the infection ; (2) *Acquired* (*a*) developed as result of recovery from infective disease, or by artificial introduction of gradually increased doses of toxin—this is *active immunity*; (*b*) produced by introducing an antibody to the infecting substance in the shape of animal serum previously immunised,—this is *temporary* or *passive immunity*. When a person is exposed to infective disease there may be natural immunity, or he may acquire same and develop power to resist the poison. On recovery, immunity will persist for a longer or shorter time rendering him less liable to contract the disease again.

In the future, antibodies may possibly be increased in the organism by methods other than the injection of dead bacilli. Phagocytes will possibly be stimulated or the repellent powers of bacteria will be neutralised by the injection of sterile modified serum.—B.M.J. ii./10,858.

Immunity Reaction consists essentially in the exercise of certain capacities of *defence* on the part of the body cells in response to the exercise of certain capacities of *offence* on the part of bacilli, cocci or protozoa, which cause the disease. This paper also divides the types of immunity into '*acquired*,' *i.e.*, that depending on previous exercise of capacity of recovery by the immune individual, and '*natural*,' which is an innate character arising through the selection of more resistant individuals during racial experience of disease, and like all *innate*, as opposed to *acquired* characters, it is transmitted from parent to offspring. The albino rat, for example, is said to be immune to anthrax, or at any rate the absence of pigment (for some unexplained reason) points to an immune type. In cancer, on the other hand, the absence of pigment in the rat is associated with increased susceptibility to cancer on implantation. The *nitri-receptors* (disease toxins can be regarded as food), must, in such animals, be incapable of affording anchorage to the toxins of such organisms. The rabbit is insusceptible to the action of belladonna,—a poison to other species of rodents,—it is dissociated and assimilated or excreted

by the body cells just like ordinary food material. Natural immunity of a *positive kind, e.g.*, in the case of individuals more or less immune to tuberculosis consists in a perfected form of recovery response established during vaccine experience of the disease in which the body cells or special defensive cells, or body fluids or both, immediately respond without the necessity for any preliminary training or any attempts on the part of the disease organisms to invade the tissues.—B.M.J. i./11,1157.

Sucking a Wound.—A theory has been put forward that when an animal sucks a wound, the bacteria and their toxins enter the gastro-intestinal tract and the toxins are absorbed especially through the tonsils. Antibodies are then produced all through the body exactly as happens when a vaccine has been prepared and administered in an infinitely more complicated fashion. In part support it is pointed out that the only severe infections from which animals suffer are those of the head, a part, which in the nature of things, cannot easily be licked.—P.J. ii./11,492.

Teale and Embleton are of opinion that the **Pathogenicity and Virulence of Bacteria** depend on the presence in the susceptible animal of an antibody capable of interacting with the bacterial body; the mechanism of the cellular defences of the body is hindered by the setting free of anti-phagocytic substances (**Aggressins of Bail**), with result that the bacteria multiply to numbers sufficient to cause disease or death. By previously sensitizing animals in the anaphylactic sense, Teale and Embleton were able to alter the amount of specific antibody in the animal body so that bacteria, *saprophytic* for a particular animal became *parasitic* and led to the development of a specific disease or even a fatal septicæmia.

Local immunity in infectious diseases.

By virtue of the studies carried on for many years with different viruses, two new ideas have been brought forward. The first pertains to the selective affinity of certain bacteria for certain organs and the other aims at the immunisation of these organs without any consideration to antibody formation. Because of these new facts, the principle of vaccination by the mouth, or by way of the skin, does not appear illogical. It has been demonstrated that the intestinal wall may be infected and may acquire its independent immunity, and also that the skin is susceptible to its own diseases and reacts against them with its own defensive mechanism, thereby establishing an immunity affording protection to the entire animal organism.

ANTHRAX has always been regarded as a typical generalised infection. All attempts to vaccinate the guinea-pig against this infection by intraperitoneal or intravenous inoculation failed, and it was believed that this animal could acquire no immunity against the anthrax bacillus. This has now been disproved; following the inoculation of an attenuated virus into the skin, or by rubbing the virus over a larger surface of shaved skin the guinea-pig acquires such immunity that it may resist hundreds or even thousands of times the lethal dose.

The facts observed in the case of anthrax are also largely true for other bacteria. It has been proved by rabbit experiments that no matter what method of inoculation is employed in the case of dysentery, the typhoid and paratyphoid fevers, and cholera, it is always the intestine that carries the burden of infection, and it is therefore the intestine that should be treated if we wish to obtain a rational vaccination against these diseases. A solid immunity against the dysentery bacillus has been conferred on rabbits by vaccination by way of the intestinal tract. The dysentery virus always reaches the intestinal mucosa irrespective of the mode of inoculation, and the method of vaccination by choice should be by way of the mouth. This was confirmed by Ch. Nicolle who vaccinated two Europeans by this method, and

then submitted them and two controls to the ingestion of a living virulent culture of dysentery bacilli—only the controls contracted the disease. This was further proved in the cases of two severe epidemics, one amongst some soldiers at Versailles, and the other in a refuge camp in Petrograd, both in 1923. In the first case 28·86% of the unvaccinated developed dysentery, as against 7·69% of the vaccinated, and in the second case the percentage was 3·17 unvaccinated, as against 0·3 vaccinated.

With regard to TYPHOID and CHOLERA, it has been found from animal experiments that large quantities of the living virus given by the mouth produce no effect, owing, apparently to an intestinal defence. This defence was overcome by the administration of Ox bile, which renders the intestine permeable. In animals so treated it was found that the infection localised itself almost entirely along the intestinal wall. It is therefore the intestine that should be vaccinated to secure definite immunity to these diseases. The reason why intravenous gives better results than subcutaneous inoculation of vaccine, is because in the former case the entire dose reaches the intestinal wall, and in the latter case the vaccines are to a large extent withheld in the tissues *en route*. Vaccination *per os* is the most direct method and assures the maximum result.

The first attempt to vaccinate men with typhoid, employing vaccine with bile, was made near Pas-de-Calais, with encouraging results. It was again employed in 1922 at a military school at La Fleche during a typhoid epidemic. 253 of the students were vaccinated by subcutaneous inoculation with typhoid paratyphoid vaccine, and 268 were vaccinated *per os*. Of the former, 10 contracted the disease during 20 days following the inoculation, and of the latter 5 contracted the disease during the following 11 days, thus proving that vaccination *per os* is, *at least*, as effective as by the subcutaneous method.

Following on the results obtained in anthrax infection, experiments were carried out to determine whether the facts observed were also applicable to staphylococcus and streptococcus infections. A large number of cases of infections localised in the skin or in the bone have been treated with antibacterial dressings. In the majority of cases the filtrate of the broth culture was employed. Furunculosis, boils, osteitis, osteomyelitis and various infections, with or without fistula, were treated with success. This justifies the theory that vaccine therapy should be based not on antibody production, but by direct vaccination of the receptive cell.

According to the conception of the author, vaccine therapy aims less at curing the diseased cells, but more to protecting those cells which are still well. In order to employ the vaccine in a rational manner, it should be applied to the region of the receptive cells.—Abstract of paper by Prof. Besredka, read by H. Plotz before the Roy. Soc. Trop. Med. Trans., Vol. 17, Jan. '24.

In the discussion on the paper, criticism was made by F. H. Teale and W. E. Gye that so far in England no one had been able to reproduce intestinal infections by implicitly following Besredka's methods. Several other experimenters have failed to convince themselves that the oral administration of a vaccine of dead bacteria with bile produces better immunity than intravenous inoculation.

Teale also mentioned that the port of entry of organisms, such as typhoid, paratyphoid, cholera and dysentery, is through the bucco-pharyngeal mucous membrane, and that in naturally-acquired diseases with these organisms the bacteria gain access to the intestine by way of the blood and not by way of the lumen of the gut. He also stated that the mucous membrane of the whole length of the alimentary canal was one large channel, by means of which any bacterium gaining access to the body was eliminated. He was able to confirm Besredka's experiments *re* the immunisation of rabbits, guinea-pigs, etc., by intradermic inoculations with anthrax bacilli, staphylococci and some other organisms, and agreed that the circulating recognisable antibody provoked by inoculation of bacteria, etc., was not to be regarded as the index of the animals' immunity.

Plotz, in reply to a question by Prof. J. C. G. Ledingham, stated that the study of the use of dysentery vaccine *per os* had been undertaken by the Medical Section of the League of Nations, and comprised the vaccination of 29,880

refugees in camps in Greece. As a result of the treatment not one person contracted the disease, and in those regions where dysentery was epidemic this method of vaccination had completely stopped the epidemics.

Replying to Col. Harvey as to the dose of bile and vaccine used he stated that the dose was 20 centigrams of desiccated bile in gluten. Several strains of typhoid and paratyphoid bacilli were employed; these were grown on agar, killed and desiccated. The dose was 0·05 Gm.

DIGESTIBILITY OF BACTERIA. Although of nitrogenous base, bacterial cells are not digested by powerful proteolytic ferments. They can live and multiply in solutions which split up proteins of which by chemical analysis they have been shown to be composed—hence their vitality in the intestinal tract. Digestion and adsorption experiments. Their lipoidal envelopes protect them —C. E. Dukes, B.M.J. i./22,430.

Parasites of Bacteria to be called **Bacteriophages**, thought by d'Herelle of the Pasteur Institute to be widespread.—B.M.J. i./22,362.

Papers, on the nature of, opened by F. d'Herelle, B.M.J. ii./22,289; F. W. Twort on, *ibid.* 293; J. Bordet on, *ibid.* 296; J. C. G. Ledingham on, *ibid.* 297; J. W. McLeod on, *ibid.* 298. See also Leader *ibid.* 313. d'Herelle's Book on, reviewed, B.M.J. i./23,901.

Microbial parasites of bacteria. Lytic action on culture of B. Dysenteriæ. —F. d'Herelle, M.P.C., Aug. 24/21,142.

Anti-Sera are always made as **Polyvalent** as possible, *i.e.*, many strains of the bacterium are employed for inoculation.

In the **preparation of Antiserum** the toxin is injected subcutaneously into the animal, *e.g.*, the horse, with strict aseptic precautions. The toxin is usually at first mixed with anti-toxin or the animal has a large protective dose of anti-toxin given before the inoculation is started. Some reaction, rise in temperature and malaise occur. Further injections are made at intervals. The quantity injected is gradually increased, and subsequently the injections may be intravenous. The blood is removed from the animal by the aid of a large sterilised canula, from the jugular vein, 6 to 12 litres may be collected in sterile flasks. The clot is allowed to form by standing 24 to 48 hours, and the serum is decanted into sterile bottles after the addition, by some manufacturers, of 0·3% of Trikresol or 0·2% of Phenol.

Some of the disadvantages of Serum Therapy.—Certain types of bacteria, *e.g.*, the *Streptococci* and *B. Coli* are only general names for very numerous families, and the antibodies efficient against one member may be altogether without effect on another member of the family. Polyvalent sera have been attended with some success but many failures may still be ascribed to this difficulty. Further, the added immunity in the use of a serum is limited in kind and extent. They may be deficient in certain necessary properties, *e.g.* may not be sufficiently anti-endotoxic, etc. Again, the Serum may render the patient hypersensitive to future injections of serum from that animal from which the antiserum was prepared. To guard against this it is necessary to inquire before use whether and when the patient has been previously treated with an antiserum.

Coming now to the more detailed consideration of **Vaccines** the following table, giving approximate initial doses for treatment and for prophylaxis in the adult, which we have arranged, should be useful for reference :—

Table of Vaccines.

Arranged alphabetically.

Vaccine.	Prophylactic dose. Initial.	Final.	Therapeutic dose. Initial.	Final.
Acne Bacillus ..	Not used.		5 mill.	500 mill.
Actinomycosis ..	,,		5 ,,	100 ,,
			or 0·001 mgr.	0·02 mgr.
Cholera	500 mill.	2000 mill.	Not used.	
B. Coli	100 ,,	2000 ,,	5 mill.	500 mill.
Combined for Colds	100 ,,	1000 ,,	50 ,,	1000 ,,
B. Diphtheriæ ..	Not used.		25 ,,	500 ,,
B. Dysenteriæ ..	500 mill.	2000 mill.	5 ,,	1000 ,,
B. Friedländer ..	250 ,,	1000 ,,	5 ,,	1000 ,,
Gonococcus ..	Not used.		25 ,,	1000 ,,
Hay Fever.. ..	25 units.	1000 units.	5 units.	500 units
B. Influenzæ ..	100 mill.	2000 mill.	10 mill.	2000 mill.
M. Catarrhalis ..	250 ,,	2000 ,,	10 ,,	1000 ,,
M. Melitensis ..	1000 ,,	2000	50 ,,	1000 ,,
Meningococcus ..	Not used.		50 ,,	2000 ,,
B. Ozaenæ.. ..	,,		50 ,,	1000 ,,
B. Pestis	500 mill.	1000 mill.	50 ,,	1000 ,,
Pneumococcus ..	250 ,,	2000 ,,	10 ,,	2000 ,,
B. Pyocyaneus ..	Not used.		5 ,,	1000 ,,
B. Septus	250 mill.	2000 mill.	50 ,,	2000 ,,
Streptococcus ..	250 ,,	2000 ,,	5 ,,	1000 ,,
Strepto. Rheumaticus	Not used.		5 ,,	1000 ,,
Strepto. Scarlatinæ	500 mill.	2000 mill.	5 ,,	1000 ,,
Tuberculin, A.F. ..	Not used.		0·00001 Cc. upwards	
,, **B.E.** ..	,,		0·00001 Cc. upwards	
,, **T.R,** ..	,,		0·00001 Cc. upwards	
Tuberculins, Various, see Tuberculin Chapter.				
B. Typhosus (and B. Paratyphosus)	500 mill.	2000 mill.	50 mill.	1000 mill
B. Whooping Cough	500 ,,	2000 ,,	5 ,,	2000 ,,

In **Prophylaxis** the above doses are suitable in the majority of cases. The **Intervals between doses** should never be less than 7 days and may be extended to 14 days with advantage.

In **Treatment** as regards dose it is a safe rule to follow that the more acute the infection and the more "toxic" the patient the smaller the initial dose. The doses above stated are sufficiently small except possibly in severe generalised infections with marked toxæmia in which perhaps the doses may be halved. As regards **Intervals** there is no general rule but the smaller the dose the shorter should be the interval between doses. Thus in septicaemic cases where minimal doses are employed these may be required daily or every other day. Clinical signs, the focal and general reactions afford the necessary guidance.

Combined Vaccines. The simultaneous use of a combination of organisms does not entail reduction in doses of the constituents.

Doses for Children:—

Under 3 years.	1/5 adult dose.	From 7–10 years.	1/3 adult dose
From 3–7 years.	1/4 adult dose.	From 10–14 years.	1/2 adult dose

Varieties of Vaccines.

The following are in use :—

(1) The ordinary type of vaccine which is a suspension (emulsion) of the killed or attenuated bacteria in Normal Saline with, as a rule, ½% Phenol or Trikresol as antiseptic.

(2) **Sensitised Vaccines.** Suspensions of the dead or living organisms which have been treated with the corresponding Antiserum with the result that certain antibodies in the serum enter into close combination with the bacteria. Gibson's Antidysenteric Vaccine may be mentioned as an example.

(3) **Detoxicated Vaccines.** Thomson evolved the idea of treating bacteria, *e.g.*, the gonococcus, with an alkaline solvent, whereby the stroma or bacterial protoplasm and the toxic endotoxin are dissolved. On treatment with acid or acid salt the stroma is again precipitated, the idea being that the toxin is in the solution —the latter is rejected and the bacterial substance, after washing and suspending in suitable slightly acid medium, is used therapeutically.

(4) The toxic products of the bacterial growth, either *e.g.*, as in the case of Mallein in an albuminous medium, or as in Tuberculin "A.F." in a medium which is protein-free. The former clearly contain the products of metabolism of the protein-containing medium, while the latter contains only the toxic excretions of the bacilli and small amounts of endotoxin liberated by autolysis of the organisms.

Preparation and Standardisation of Vaccines:—

A Vaccine is best prepared from the organism isolated from the patient, but in case of *B. Tuberculosis* this is not essential, and there are many obstacles in the way in other diseases, *e.g.*, in the case of *Gonococcus* it may be difficult to secure a pure culture, and the loss of time may be of immense importance. In the case of tubercle it is suggested to employ a stock Tuberculin while a special one is being prepared from the case. *Staphylococcus Albus* and *Aureus* are usually in (i.) a state of purity, though in limited numbers, or are (ii.) mixed as in periostitis and osteo-myelitis. *Streptococci* are isolated from pus or blood (for the latter 5 Cc. at least are necessary). Dilutions of $\frac{1}{2}$, 1 and 2 Cc. with 10% of Sodium Citrate are made with 10 Cc. of broth incubated at 37° C. The colonies develop in the clot which forms, and the organism is further isolated in the usual manner.

For *Gonococcus*, Blood Agar or Nutrose Ascitic Agar and other special media are used; for *Pneumococcus* Human Blood Agar. For *B. Coli*, McCONKEY'S Medium (2% Agar containing 2% Lactose coloured by Neutral Red, *cf.* Vol. II.), is used. *Friedlander's Bacillus* is isolated with ease by cultivation in broth—it inhibits all other organisms. *B. Septus* or *B. Coryzæ Segmentosus* is easily plated from nasal or pharyngeal mucus, *M. Catarrhalis* from the same source by aid of Blood Serum, or Blood Agar plates, the *Meningococcus* from the cerebro-spinal fluid by lumbar puncture and culture on blood serum.

The Vaccine is then standardised by mixing same with *an equal volume* of normal blood together with 4 or 5 volumes of Sodium Citrate Solution, and counting the red corpuscles 'R' and the bacilli 'B' in a given area. Knowing that a cubic mm. of blood contains 5,000,000 Red Corpuscles we have

$$\text{Number of Organisms per Cmm.} = \frac{5{,}000{,}000 \times B}{R.}$$

The organisms are then devitalised by a temperature of 56° C., and the Vaccines introduced into $\frac{1}{2}$ and 1 Cc. tubes. Preservative in the form of Trikresol as mentioned, is added. We are informed that the use of Phenol may cause carboluria in intolerants.

The **Hæmocytometer** may also be used.—J. G. Callison, Jl. Med. Research, Nov., 1912.

Gordon's method of estimating the strength of bacterial suspensions.

Take two clean thin-walled test tubes as nearly alike as possible (" cordite " tubes are best).

Fill one with tap-water (*a*) and into the other (*b*) put 100 cmm. of the bacterial suspension.

Add tap-water 1 Cc. at a time to (*b*), mix by inversion, and compare the two tubes (*a* and *b*).

Continue adding tap-water to (*b*) until a point is reached when a definite difference can be observed in the opacity of (*a*) and (*b*), when looked at against a north sky but not when looked at against a black tile.

At this point the suspension contains 100 million bacteria per Cc.

The strength of the original suspension can now be calculated, Ex. :—

100 cmm. of a bacterial suspension required 8 Cc. to reduce it to 100 million per Cc.

∴ 100 cmm. contains 800 million bacteria.

∴ 1 Cc. contains 8,000 million bacteria.

A METHOD OF PREPARING VACCINES, obviating the diminution of vaccinating properties and the increase in toxicity consequent on devitalisation at a high temperature. The cultures on gelose are emulsified in Saline solution, which is dosed 50 milliards per Cc. The solution, in an aluminium tube, is placed in a freezing apparatus with a constant temperature of −18° C. and left for 5 hours, when it is taken out and left another 5 hours at room temperature ; thus freezing and thawing has taken place. The operation must be repeated twice for pneumococcus and streptococcus, 4 times for B. coli and 6 times for staphylococcus and enterococcus. Vaccines prepared in this way have been found completely sterile and non-toxic.—Réné Zivy, L. i./24,221.

Interaction between the tissues and the dead micro-organism occurs by which antibacterial substances are liberated into the blood stream. The reaction, by reason of the minute dose of dead bacteria and the magnitude of the response in the tissues, may be compared with the prolonged action of enzymes. The Anti-toxins in a *serum* probably act simply by combining with the toxin and rendering it harmless in proportion to the relative amounts of the two substances—any further action being due to the presence of bacterial protein in the serum, which acts as a feeble vaccine. This would explain the lack of result with sera except in diphtheria, etc., where the development is limited, and in which the destructive power is in the toxins poured into the circulation. The theory of **Immunisation** depends on the human being having a sufficiency of anti-bacterial substances to kill off the infecting organism. If the latter gains access and colonisation begins, the destruction of a portion of the invaders strengthens the defending force. This phenomenon —(**Auto-inoculation**—*vide* later) is best seen in the pneumonic crisis, or in the rise of protection after a crop of boils. The protection may be lasting as in small-pox, or very transient, as in tuberculosis. —A. Butler Harris, Pr. i./09,647.

The bacterial invasion, if not too large, may as the result of the destruction of a few of the bacteria in question, lead to self immunisation and recovery, and the introduction of a bacterial vaccine may form the turning point, producing, as it does, the reinforcement of the defending forces that was necessary.

As regards **immunising power**, the following is a rough **order of Merit** of some vaccines, commencing with the most potent :—

Pneumococcic Vaccine and
Catarrhal organism Vaccines
(excluding Influenza)
Typhoid Vaccine.
Gonococcic ,,
Streptococcic ,,
B. Coli Vaccine.
Acne and Staphylococcic Vaccines.
Influenza Vaccine.
Dysentery Vaccine.
Cerebro-Spinal Meningitis Vaccine.

Dose* of *Vaccines.—In order that an adequate supply of immunising substances may reach the part the stimulus applied to their formation must correspond, and measures must be taken to increase their accessibility to the part. Thus in a *septicæmia* the bacteria and their toxins are speedily carried to the site of formation of immune bodies; this also holds to a less degree, say, in the case of a *prostatitis*, and to a much less degree for an infection located in the *skin*, *cornea* or *conjunctiva*. In the case of a *gonococcal septicæmia* the correct initial dose is, therefore, smaller than in the instance of a *gonococcal prostatitis*, whilst for conjunctivitis the increase in dosage must be correspondingly greater. For a severe *pneumococcal septicæmia* an initial dose of ten millions will suffice; for an established *pneumonia* where the pneumococci are certainly in the lung tissues and probably in the blood, twenty-five millions may be employed; for a *pneumonic catarrh* where the pneumococcus is located in the mucus and superficial tracheal or pharyngeal cells fifty or a hundred millions may be requisite; finally, for a *pneumococcal keratitis* or *ulcus serpens corneæ*, a minimum of 250 millions may alone avail. The relative toxicity of the vaccine must also be taken into account. This depends partly on the organism in question, partly upon the method of preparation; *overheating a vaccine for sterilisation purposes materially increases its toxicity.* The toxicity of a staphylococcal vaccine is but slight, that of one of the *Bacillus Coli* considerable; the initial dose in toxæmic conditions of the former vaccine may, therefore, be greater than that of the latter; still the amount of toxin introduced along with even a considerable dose of vaccine must be relatively very small. The focal reaction when this can be observed in the first place and the general or constitutional reaction in the second, *i.e.*, pulse, temperature, general condition, and clinical signs and symptoms. with a bacteriological examination of the secretion, if any, act as complete guides in determining future doses and intervals.

Too large a dose of Vaccine would cause an unpleasant reaction, and it would do harm by diminishing instead of increasing the patient's resistance. Not only must the proper dose of Vaccine be given but the successive doses must be spaced and not given too close to one another.

General References to Vaccine Therapy.—The application of Vaccine Therapy is limited *first* by the fact that the capacity for antibacterial response in the body is limited, *secondly* by the existence of individual peculiarities of disease manifestations, *thirdly* by the fact that we are still in the dark as to the means to be adopted to bring out the highest degree of antibacterial response. The body fluids containing antibacterial substances must have free access to the focus of infection,—*cf.*, the difficulties in tuberculosis and typhoid carriers (in

t

which latter the Bacilli are multiplying on free surfaces of the body). There are no hard and fast rules regarding dosage and intervals—each vaccination must be looked upon as an experiment of a most tedious character.—L. ii./10,1626.

1,000 inoculations,—chiefly in private practice. The report includes (α) cures and hopeful cases, (β) relapses, and (γ) absence of response to the treatment. Series No. 1 included whitlow, furunculosis, acute otitis media, dermatitis, lymphangitis, abscess, carbuncle, acne, etc. 28 out of 32 of this series were α; Series II. (Strepto. Infection) 3 out of 4 were α; one of these, an extraordinary case of a woman run over by a motor bus. No bones broken, but great laceration of tissues; these broke down and inflammation extended so that the limb was simply a bag of pus. First 500,000 Cocci given without effect, 3 days later 3 million caused drop of temperature from 105 to normal, and limb and life saved. Series III., Coli Infection, 4 out of 6 α; Series IV. Catarrhal Organisms, 7 out of 8 α; Series V., Tubercle Infections, 17 out of 37, α, 5 β, 8 γ.—B.M.J. i./11,128.

Vaccine Therapy in Eye Work.—Correct diagnosis essential. *Ophthalmia neonatorum* depends on infection of several organisms—the Gonococcus, Streptococcus, Staphylococcus, and others. In Vaccine Therapy, by imitating nature, antibodies are created at the site of injection, distant from the original infection, and these circulating in the blood stream exert a beneficial effect on the distant lesion. Tuberculin, Staphylococcic and Streptococcic Vaccines, as also Gonococcic Vaccines, have proved themselves of value in eye work. —J. W. H. Eyre, B.M.J. ii./10,1310.

Serum and Vaccine Therapy in connection with diseases of the eye.—C. W. G. Bryan, B.M.J. i./12,589,662.

Clive Riviere quotes such methods as poulticing and fomentations as examples of "Empirical Vaccine Therapy." "Irrigation often constitutes auto-inoculation." In infections of the mucous membranes, *e.g.*, bronchitis, the increased flooding (by means of Emetine, Salts of Antimony, Apomorphina and the Iodides) of the mucous membrane with healing serum is no small element in their favourable result. All these drugs cause a watery exudation through the bronchial mucous membrane. In the same way Squill and Ammonium Carbonate, besides being expectorants, are gastro-intestine irritants and emetic in full doses. Thus they increase the secretion from the bronchial mucous membrane and at the same time raise the general blood pressure by their action as vaso-motor and cardiac tonics, hence increase the blood supply to the bronchial tubes by both systemic and pulmonary blood channels.—L. i./11,220.

Disappointments with Vaccine Therapy—notably in chronic staphylococcic skin infections and in tuberculin treatment of lupus vulgaris. Most dermatologists will not now recommend Tuberculin treatment as a likely cure for lupus vulgaris.—H. G. Adamson, L. ii./18,172.

Autogenous Vaccines *i.e.* Vaccines prepared from cultures obtained directly from the patient should be used (a) when the infecting agent belongs to an ill-defined group, *e.g. B. Coli* infections; (b) when the infection is severe and it is felt to be too great a risk to wait and see whether stock vaccine is effective; (c) when treatment with stock vaccine has failed.—From a good general lecture by A. Fleming, B.M.J. i./21,254.

Autogenous Vaccines, advantages of. Recent advances in vaccine therapy —H. E. Annett, B.P. Conf., 1919.

Technique of Injecting a Vaccine.

The skin over the selected area should be sterilised with Iodine or Diluted Diffusol or other Cresylic Disinfectant; too strong applications should be avoided.

Site of Injection.

The best sites are: (1) the arm, preferably the upper arm near the insertion of the deltoid; (2) 1½ inches below the centre of the clavicle; (3) high up on the buttock near the spine; (4) the flank.

The inoculation may be made either into the subcutaneous tissue as sites (1) and (2) above or into the muscles (site 3). The injection is made with a sterile all-glass syringe, the ampoule being thoroughly shaken before drawing up the contents, as the emulsions tend to settle and may adhere strongly to the glass.

A good fold of tissue is taken up between the left thumb and forefinger, the injection is made boldly, and the puncture wiped with antiseptic. Vaccines are occasionally given *by the mouth* ; this method should only be employed when the subcutaneous route is contra-indicated, as in cases of widespread skin infection, or other special reason. The stomach should be absolutely free from food residues and the vaccine should be diluted to 10–20 Cc. with normal serum or saline. In cases with furred tongue or catarrh of the stomach this method is absolutely contra-indicated. The rectal method should never be employed.

Local and General Effects of the Injection.

(*a*) *Local.*

In 12–24 hours there may be some redness, swelling, pain, and tenderness at the site of inoculation, and for an area of 2–3 inches around it. This affords little or no indication of the immunising response—as many other factors are concerned, *viz.* (1) the volume of the inoculum (which should be small) ; (2) the amount of antiseptic ; (3) the property of the bacillus for forming powerful toxins ; (4) the laxity or otherwise of the tissues into which the injection was made ; (5) the number of bacteria employed.

(*b*) *General Effects.*—

(1) One of the results of the administration of an appropriate dose of the appropriate vaccine is the production of a local hyperæmia round and in the infected focus ; this is best seen in cases of iritis, laryngitis and acute skin infections. (2) Other effects which vary with the dosage are a rise in temperature in about 12 hours, which should not exceed 1·5° F., a rise in pulse rate, which should not exceed 20 beats, a slight feeling of malaise and perhaps a little headache ; these should all pass off within 24 hours : if the temperature and pulse were previously unduly high they then should assume a better level, and the malaise and headache should be succeeded by a feeling of increased well-being.

Other clinical symptoms should also improve. If none of these result the dosage employed was too small.

The signal for reinoculation is retrogression of the patient or failure to continue to improve.

Increase of dosage is indicated by failure to secure any general reaction, or by mere transitory improvement on the part of the patient.

The more acute the lesion and the greater the toxæmia of the patient the smaller should the initial dose be; in the case of the more chronic lesions a considerably higher (2–10 times) initial dosage may be safely used. When the blood and lymph supply to an affected part is poor, as for instance the skin and cornea, still higher doses are advisable.

Acne.

The **Acne Bacillus**, *Syn.*, **Bottle Bacillus**, may alone be the cause of acne, especially of the non-pustular forms,—in the majority of cases, however, it is associated with the Staphylococcus.

Acne Bacillus Vaccine. *Syn.*, **Acne Bacterin**, is indicated in the above cases where comedones are the principal features. Combination with polyvalent staphylococcus albus vaccine may be advisable. *Initial dose*, 5 millions ; 20 millions is the usual necessary maximum,—a final dose of 50 millions may be wanted. Occasionally patients tolerate and indeed require for cure up to 500 millions as the final dose. The interval between doses is 7 to 10 days.

Ampoules are prepared each containing these doses.

For cultivation of the Bacillus and preparation of Vaccine see Vol. II.

Not a panacea. Acne has been made worse by Vaccines,—two cases disfigured for life by the treatment.—L. i./11,743.

Acne Bacillus and Staphylococcus Mixed Vaccine is prepared as follows :—

Acne, 5 millions with Staphylo. 100 and 250 millions ; Acne, 10 millions with Staphylo. 250, 500, 1,000 and 2,000 millions ; Acne, 20 millions with Staphylo. 2,000 millions.

Anthrax.

Vaccines have been prepared by cultivating the bacillus under conditions unfavourable to its growth, by which the toxicity is greatly reduced, but they are not on the market, and are not used in human beings. The following serum has been considerably used :—

Anti-Anthrax Serum (Sclavo's). Each tube contains 10 Cc.

An Antibacterial Serum, stimulating the activity of the phagocytes. Prepared by immunisation of asses at Siena in Italy.—(Legge).

Dose.—In three or four different parts of the skin of the abdomen, injections of 10 Cc. each are made at one time. After 24 hours if there has been no improvement either in the general or local condition, further injections of 40 Cc. are to be made and repeated next day if necessary.

A rise in temperature following on the injection of the serum is to be regarded as a favourable indication. Sometimes a rash develops three to eight days after treatment, with or without febrile symptoms. If it occurs it is unimportant. The earlier the treatment can be commenced, the more easily can the infection be combated. The Serum *will keep* for two years in the dark—a slight deposit in it is negligible. *Technique of the Injections.*—Disinfect the skin with a little Ether, and then with a 2 per 1,000 Sublimate solution or with Ether Soap, *q.v.* After injection wash the site of injection again and apply a drop or two of Collodion.

For **intravenous injection** in severe cases 10 Cc. or more repeated after 2 or 3 hours if necessary into, where possible, one of the superficial veins at the back of the hand, distended by pressure on the forearm.—L. ii./05,803.

Results with Sclavo's Serum.—Effects reduction in temperature and increased feeling of comfort and well-being. Those wool-workers who have worked for some time sorting wool appear to acquire slight forms of Anthrax which give them immunity. A case of recovery by Sclavo's Serum first intravenously, then in the loin and subsequently *per os.* Bacteriological examination of blood and fluid removed from the chest was throughout negative. (Undoubted cases of internal anthrax rarely show the bacillus in blood or pericardial or pleural effusion more than 24 to 36 hours before death, hence justified in diagnosing by clinical symptoms).—B.M.J. i./11,751.

In a case successfully treated there was apparently an incubation period of 10 days,—rapid amelioration of the symptoms after the injection of the serum, and recovery without excision of the pustule,—most cases have been excised.—B.M.J. ii./11,103.

Natural resistance and the study of normal defence mechanisms. The site of inoculation of a test organism is of importance. Besredka in course of research on production of immunity by vaccinating that portion only of the body which is most susceptible shows on working with anthrax infection in the guinea-pig—an animal notoriously difficult to protect by any method of vaccination—that this animal (and the rabbit) tolerate easily doses of virulent anthrax given directly into the circulation or into the peritoneal cavity without contaminating the cutaneous tissues. The skin is the only susceptible part of the guinea-pig. He demonstrated further the possibility of securing solid immunity to anthrax, by whatever route inoculated, by vaccination of the skin with the attenuated Pasteurian vaccines. Requires further investigation. —Prof. J. C. G. Ledingham, L. ii./22,898. *See also* our pp. 871, 872.

Prevention of Anthrax Infection due to imported hides.—Seymour Jones' "Formic Mercury" process for disinfecting. Hides, skins, etc., are treated in the "soak" process with Formic Acid 1 to 2% and Mercury Perchloride 0·02%.—L. ii./11,1260.

Anthrax Protection.

A disinfection station erected near the wool warehouses at Mersey Docks under the auspices of the Home Office treats **wool** arriving **from the East** by a method by which not only is the natural protection of the anthrax spores removed but the spores themselves are subjected to destructive effect of Formaldehyde. The material is first washed with an alkaline warm soap solution and then disinfected at 102° F. with 2 or 2½% Formaldehyde Solution for 20 minutes in 2 stages of 10 minutes each, then dried and cooled.—B.M.J. ii./21,952. Plate *ibid.* opp. 933.

Shaving brushes infected conveyed anthrax—infection probably due to disease in the animals from which the hair used in their manufacture was originally obtained.—R. R. Elsworthy, L. i./16,20. See also E. H. Snell and E. W. G. Masterman, L. i./16,242.

Similar source of infection. The serum promptly used saved patient's life. A swab examined at Torquay from a pustule found to contain Anthrax B. at 11 p.m. 'Phoned to Martindale's for serum which was placed on the train leaving Paddington at midnight. It was administered to patient before 6 a.m. and undoubtedly saved patient's life.—C. Owen, P.J. i./17,62.

Malignant Pustule.—A variety of external anthrax,—two cases at Brighton. One recovery by excision and painting with raw Carbolic Acid, the other terminating fatally.—Reference is made to the native method of burning out anthrax in the Argentine with a red-hot wire.—L. ii./10,1275.

Asthma.

Bacteria are not the universal cause of asthma—they are merely one of the excitants of the asthmatic attack. In a number of cases the sputum collected a few hours after commencement of the attack showed :—

B. Influenzæ,	average percentage	12%.
Pneumococci	,,	,, 26%.
Streptococci	,,	,, 96%.
M. Catarrhalis	,,	,, 72%.
M. Paratetragenus	,,	,, 20%.

The low percentage of *B. Influenzæ* and *Pneumococci* is very marked but when they occur their significance is correspondingly greater. The almost universal occurrence of the *Streptococcus* group is striking and corresponds to its etiological importance. *Streptococci* are present in almost all cases in which bronchitis symptoms are in abeyance. *M. Catarrhalis* and *Pneumococcus* are the more common in cases in which bronchitis is a marked feature. The Vaccine treatment of asthma is especially difficult owing to possible sudden change of infection.

Initial dose of the various Vaccines required :—

B. Influenzæ 100 millions, **Pneumococcus** 50 millions, **Streptococcus** 25 millions, **M. Catarrhalis** and **M. Paratetragenus** 50 millions.

Whether the Vaccine is likely to prove of service or not will be determined by the response to this dose or to one of double magnitude.

The bacteriology of 15 cases in 1912–1913. *Pneumococci* predominated. Results encouraging.—J. H. H. Pirie ; B.M.J. i./13,1270

Autogenous streptococcal vaccines, 100 million micro-organisms per Cc. Initial dose ¼ to ½ Cc., increased. In over 50% the patients remained well for from ½ to 4 years.—Sir L. Rogers, B.M.J. ii./21,71.

Cases of asthma treated by autogenous vaccines which did best had *Strepto-*

cocci as almost the only organism in the sputum.—J. R. Collins, B.M.J. ii./21, 220.

Asthma and anaphylaxis. Asthmatics should not receive horse serum. Most of the deaths that have occurred after horse serum have been in the horse asthmatics.—F. Coke, B.M.J. i./21,372,582.

This subject is dealt with on pages 663 *et seq.*

Tuberculin treatment of bronchial asthma and hay fever. 'T.O.A.' employed subcutaneously; initial dose 1 Cc. of 1 : 100,000 dilution. The authors cannot explain *why* a state of hyper-sensitiveness to tuberculin increases the susceptibility for allergic reactions, nor why small amounts of tuberculin have curative effects.—W. Storm van Leeuwen and H. Varekamp. L. ii./21,1366.

Severe bronchial asthma, resistant to all other forms of treatment, successfully treated by intravenous injection of a vaccine made from germs cultivated from the blood of a patient suffering from septicæmia, and having the capacity of provoking fever and leucocytosis without injuring the organs.—Prof. Schottmüller, per Clin. Jl., April 25/23,204.

Bronchitis and Pulmonary Catarrh.—The bacteriology of bronchitis is broadly speaking the same as that of the common cold. The predominant organisms in their order and occurrence are :—

B. Influenza	present in 40%.	*M. Paratetragenus*	present in 23%
Pneumococcus	,, ,, 52%.	*B. Friedlander group*	,, ,, 7%
Streptococcus	,, ,, 53%.	*B. Septus*	,, ,, 2%
M. Catarrhalis	,, ,, 72%.	*Streptothrix*	,, ,, 3%

(Sputum to be examined after washing out the mouth and throat, and expectorating into a sterile bottle immediately on waking.)

The marked relative absence of *B. Septus* is notable. The infections of the lower passages are commonly mixed ones. The *pneumococcus* may be regarded as a frequent cause of bronchial catarrh and the most dangerous to the patient. Note also that *B. Influenzæ* may be resident in the bronchi or pulmonary cells without giving localised though marked constitutional symptoms. The sputum voided may be almost *nil.*

Doses of the Vaccines are given under the various headings.

Autogenous Vaccines are more likely to be efficacious than stock ones and it must be remembered that variation in the flora is liable to occur during the progress of immunisation, hence repeated examination necessary.

Bronchitis is pre-eminently suited for Vaccine therapy—old age and a desperate condition of the patient are not contra indications to Vaccine treatment. Accuracy in diagnosis of the infecting organism or organisms is essential. We know personally a case in old age which was extraordinarily benefitted by an autogenous Vaccine.—W. H. M.

Chronic or frequently recurrent bronchitis 16 cases. In 1913 J. H. H. Pirie did not find *B. Influenzæ.* The organism was rare at the time in Scotland. Results on the whole good.—B.M.J. i./13,1269.

Bronchitis, asthma and complications, especially bronchial catarrh and dyspnœa following influenza, pneumonia and acute bronchitis. Success with autogenous vaccines.—T. and G. Bodley Scott, L. ii./12,879.

Autogenous Vaccine Therapy in bronchitis. Loopfuls of fresh sputum sown on Agar, Pfeiffer's Agar or Nasgar and Vaccines made after 15 to 36 hours growth. Subculturing was purposely avoided. *M. Catarrhalis* the predominating organism with *pneumococcus* The frequent accompanying forms of *M. Catarrhalis* can do no harm.

Dose increased about 1/3 to ½ of the former one—*initial* dose being about 25 to 40 millions. Special stress laid on using *fresh* sputum. Sterilise by heating at 60° C. for ¼ hour. Give dose large enough to produce a reaction, but avoid a prolonged negative phase.—H. T. Gillett, B.M.J. i /13,387, *q.v.*, also for further references *re* Bacteriology of Bronchitis.

Purulent Bronchitis. Its influenzal and pneumococcal bacteriology. Prophylaxis—at weekly intervals beginning in September and January a vaccine containing 100, 250, 250, 500, 500 million pneumococci and twice as many B. influenzæ confined to those who have infected foci or who are

susceptible to bronchial and pulmonary infections. Incidence rate may be diminished by the Chloramine or Zinc Sulphate atomiser as used for meningococcus carriers.—R. W. Allen, L. ii./17,509.

Chronic bronchitis treated with autogenous vaccines. The sputum should be sent to the bacteriologist promptly. If possible, it should not be allowed to get cold. It is important that nasal cultures be sent in addition to sputum. —L. Mackey, B.M.J. ii./22,715.

Vaccine consisting of *pneumococci, staphylococci, streptococci, coccobacilli* of *Pfeiffer* and *M. Catarrhalis* (500 mill. of each) found to be the most successful treatment in broncho-pulmonary epidemic at Likasi, the percentage of deaths being only 9, as against 14 with both Emetine and colloid treatment.—R. Van Nitsen and P. Walravens, per Jl. Trop. Med., May 1/23,149.

Catarrh, Nasal and Tracheal.

The organisms principally involved—either singly or mixed, in setting up acute catarrhal infections of the respiratory tract are the *B. Influenzæ, Pneumococcus, B. Septus, Streptococcus* and *M. Catarrhalis.* The organisms appear in cycles. Thus *B. Septus* may be found in 80 to 90% of the cases in each epidemic for two or three successive years and then disappear altogether for 4 or 5 years.

Combined Vaccine for Colds and Influenza (Wimpole Institute). The composition of this vaccine is altered slightly from time to time to suit prevailing epidemics; for general use at present it contains *B. Influenzæ, Pneumococcus, Streptococcus, B. Septus,* and *M. Catarrhalis* in the proportions 2 : 1 : 1 : 1 : 1.

Ampoules for Hypodermic Use contain 25, 50, 100, 250, 500 and 1000 millions of each organism respectively with exception of *B. Influenzæ* which is double.

Initial dose.—The contents of an ampoule containing 50 millions of each organism.

Children of 10 to 15 years should receive half doses.

A dose of 100 millions *as a preventive* against colds in those subject to such attacks, followed in 7 days by one of 250 millions, and again after 7 days by one of 500 millions, which may well be repeated or increased to 1000 millions if no marked reaction ensue, has proved very efficacious. It is also suitable for immunising against and treatment of influenza.

The earlier the treatment is begun the better (with patient in bed); inoculation is best in the evening between 7 and 10.

Has proved of great value not only in the treatment of catarrhs, acute and chronic, but also in cases of pulmonary phthisis, where bronchitic symptoms are conspicuous—in such cases where Staphylococci or Streptococci are the secondarily infecting organisms no good can be expected from the use of this vaccine.

A dose of this Vaccine in 48 hours completely cleared up a stubborn catarrh with most intractable swelling of the turbinals, which had resisted all ordinary remedies for a week.—D. J. Munro, 25/1/13.

Bacillus Septus Vaccine.—Infection by *B. Septus* usually begins with dryness or tickling of the soft palate, the inflammatory condition extending within 24 hours to the nasal mucosa, so that sneezing and discharge of thin nasal mucus result, and to the pharynx causing pain in swallowing. Cough other than pharyngeal is not present and expectoration scanty. After three or four days a subacute stage follows the acute. This also lasts about the same time.

The Vaccine is for use in simple cold which has begun with sore throat, where cough and tracheitis are absent. The initial dose of 50 millions may be given at any stage of an attack, best at bedtime, and may be repeated or increased in five days. For immunising purposes a dose of 250 millions should be followed in 7 to 10 days by one of 500 millions, which after another 7 to 10 days should be repeated or increased to 1000 millions. The resultant immunity lasts for 4 to 6 months on this. *Ampoules* contain 50, 100, 250, 500 and 1000 millions.

Cases of pneumonia treated with stock mixed cold Vaccine (St. M. H.). Temperature came to normal in 24 to 36 hours. Some pneumonias may have a mixed origin and so yield more readily to a vaccine of this kind.—A. C. Wilson, L. ii./15,253.

Friedländer's Bacillus Vaccine (Wimpole Inst.).

For use in treatment of nasal catarrh, alkaline antiseptic douches being used as adjuvants; should prove of benefit and prevent the recurrence of fresh attacks of "cold" so far as this organism is concerned; also of service in chronic bronchitis and urethritis. The *initial dose* of the "Friedländer" vaccine is 10 millions.

To be repeated or increased at intervals first of 3 days, then 7–10 days. Ultimate dose 1,000 millions.

Uncomplicated chronic nasal catarrh is very often due to *B. Friedlander*, when the Eustachian tube and middle ear are involved, to the *M. Catarrhalis*, and when the antrum or sinuses are involved, to the *Pneumococcus* and *B. Influenzæ*.

Ampoules contain 50, 100, 250, and 500 million organisms.

Fibrosis of lung well treated by stock vaccine.—L. i./14,1911.

Micrococcus Catarrhalis Vaccine.—Is of service in nasal tracheal and bronchial catarrhs, both acute and chronic, in bronchitis and bronchitic asthma and in catarrh of the middle ear, when the causal relationship of this organism to the attack has been demonstrated. *Initial dose* of 10 millions may be repeated in 5–7 days. In chronic cases 1,000 millions or more may be ultimately necessary.

Ampoules contain 10, 50, 100, 250, 500, and 1,000 millions.

M. Catarrhalis is one of the constituents of the Combined Vaccine for Colds *antea*. *M. Catarrhalis* infections may begin at any part of the respiratory tract—characteristically with an inflamed feeling of the fauces and nasopharynx.

Chronic tracheal catarrh is frequently due to infection by this organism or *M. paratetragenus*, to which secondary infection by staphylococci, streptococci, pneumococci, and other organisms may be added, or to the pneumococcus alone. Cultivations from the trachea showed that non-Gram-staining *Cocci* are present in 78% of normal throats, and 68% of catarrhal throats.

M. Catarrhalis is well known as a cause of common colds and the more serious influenza, bronchitis, and pneumonia. Causes very irritable cough with scanty viscid expectoration. It grows best on blood agar, and produces no acid in glucose broth. *B. Septus* causes a mild pharyngitis with painful throat, muscular pain, with, however, no temperature and little or no nasal catarrh,—probably a common cause of stiff neck and muscular rheumatism. *B. Friedlander* occurs in many acute and chronic colds, and may cause very profuse coryza.

M. Tetragenus Septicæmia. An autogenous vaccine containing this and a pseudo-diphtheroid bacillus (non-pathogenic), gave good results.—L.i./13,1723.

Respiratory diseases—14 cases treated with vaccines of *M. Catarrhalis, pneumococci, stapyhlococci, streptococci*, etc.—Good results.—R. J. Rowlette, L. i./15,1339.

Chronic Nasal Catarrh treated by Autogenous Vaccines; a good proportion of cures.—L. Mackey, B.M.J. ii./19,159.

Directions for taking secretion for preparations of an Autogenous Vaccine.

If in the throat, the mouth is to be washed out in the morning with sterile water, and the throat to be gargled, as also teeth washed with same, then patient is to spit once into a sterile bottle. If, on the other hand, the infection is in the nose, the entrance to the nostrils should be washed with soap and water and discharge blown into a sterilised bottle, or better, post-nasal swabs should be taken.

Vaccines by the Mouth.—These catarrhal (and other) Vaccines are occasionally ordered to be taken *by the mouth* on an empty stomach, but the method is little used and not recommended.

Immunisation by the mouth. At one time the opinion was 'pro' but later 'con'—the mere possibility of efficacy was questioned in view of the extent to which foreign protein is broken down in amino-acids before absorption by the intestinal mucosa. Account of Besredka's work (1918—Paratyphoid) and subsequent tests in the case of human volunteers who took *per os* large quantities of dead organisms of Malta fever and dysentery. The Malta fever volunteers inoculated with virulent cultures of *M. melitensis* remained healthy. In the case of dysentery satisfactory controlled experiments were difficult to arrange but there was much conclusive evidence.—Leader, L. ii./22,921.

For recent information on Vaccines used in Catarrhal infections see also **Influenza and Pneumonia.**

Cerebro-Spinal Fever, *Syn.* **Cerebro-Spinal Meningitis. Malignant Purpuric Fever, Petechial Fever, Spotted Fever.**

Characters of Cerebro-Spinal Fever.

It is an acute epidemic disease, characterised by profound disturbance of the central nervous system, indicated at the onset chiefly by shivering, intense headache or vertigo, or both, and persistent vomiting; subsequently by delirium, often violent, alternating with somnolence or a state of apathy or stupor; an acutely painful condition with spasm—sometimes tetanoid—of certain groups of muscles, especially the posterior muscles of the neck, occasioning retraction of the head, and an increased sensitiveness of the surface of the body. Throughout the disease there is marked depression of the vital powers; not unfrequently collapse; and in its course an eruption of vesicles, petechial, or purpuric spots, or mottling of the skin, is apt to occur. If the disease tend to recovery, the symptoms gradually subside without any critical phenomena, and convalescence is protracted; if to a fatal termination death is almost invariably preceded by coma. After death the enveloping membranes of the brain and spinal cord are found in a morbid state, of which the most notable signs are engorgement of the blood vessels, usually excessive, and an effusion of sero-purulent matter into the meshes of the pia mater and beneath the arachnoid. The name 'Spotted Fever' given to this disease is a misnomer as the spots are by no means constantly in evidence.

As a prophylactic in cerebro-spinal meningitis and influenza for treatment Tincture of Iodine mixed with an equal quantity of honey—two or three drops of the mixture on the tongue several times a day effectual.—J. A. Taylor, B.M.J. i./21,776.

Useful "Remarks on Cerebro-Spinal Fever in **Camps and Barracks**" by Sir Wm. Osler, include the following. The disease spreads slowly or indeed not at all from foci of prevalence in various parts of a country. It has prevailed chiefly in the winter and spring months; an epidemic rarely lasts into the summer. It has a higher death rate than any acute infection except plague and cholera but the total mortality is not great as the case incidence in the community is low. It will kill within 24 hours—or less.

As a rule the organisms disappear from the naso-pharynx of healthy "carriers" in the course of a few weeks. The organism (meningococcus) is a germ of low virulence, widely spread in the community and of intense virulence in an individual once it has passed the portals of protection. Whether the organism gains access by direct invasion of the meninges from the naso-pharynx through the ethmoidal or sphenoidal routes or by the blood stream is a matter of discussion. The disease may be endeavouring to win a place among the great epidemics of the world. Soldiers are peculiarly liable (owing

to exposure of bad weather and crowding in barracks, etc.), but in the great campaigns of the 19th century cerebro-spinal fever played no part as a camp disease.—B.M.J. i./15,189.

In some cases septicæmia occurs. The meningococcus does not necessarily produce naso-pharyngeal catarrh but catarrhal conditions predispose to meningococcic infection.—C. Worster-Drought and A. Mills Kennedy.—L. ii./17,711.

Royal Society of Medicine (Section of Epidemiology and State Medicine) Debate:—

Various strains of the organism exist—to one of which the name para-meningococcus has been given. The *healthy* carriers seem to play the most important part in the spread of the disease. Discrimination between the meningococcus and the gonococcus a matter of some importance—gonococcic meningitis does occur, but rarely.

East African epidemics. The disease has assumed very virulent characters. In 1913 in one tribe it killed anything between 20,000 and 40,000. Description and division of the infection into five general types.—E. N. Butler, L. i./15,692.

The incubation period may be as long as 30 days.—B.M.J. i./15,521.

Clinical features in children.—F. E. Batten, L./i.15,964.

The organism has never been isolated from dust, etc.—J. C. G. Ledingham, B.M.J. i./16,465.

Blood-sucking insects are now known not to convey the disease.

Overcrowding must be prevented. Ventilation essential, all windows to be open day and night.—H. Sutherland, L. ii./15,862; ii./16,829.

Gordon and Murray carried out a systematic examination of a number of cerebro-spinal fluid meningococci and divided same into **Four Groups**, Types I. to IV. Types I. and II. are the main groups. P. Fildes confirms their results.—L. i./18,92.

A monovalent horse serum of appropriate type would be better than polyvalent sera.—A. W. M. Ellis, B.M.J. ii./15,881. J. A. Arkwright, *ibid*, 885. See also L. ii./08,728.

Inhibitory action of saliva (normal) on the meningococcus. The action is due to its content of living bacteria (streptococci). Hence avoid contamination with saliva in taking swabbings from naso-pharynx.—M. H. Gordon, B.M.J. i./16,849.

Age incidence. In the epidemic of 1914–1915 and 1915–1916 the real most susceptible age was under 5 years—*i.e.*, during infancy and early childhood. There was a marked falling off of cases after adolescence was passed. The least susceptible age apparently was 35–40. It is a weather disease associated with the sudden saturation of the atmosphere with water vapour. The naso-pharyngeal mucous membrane is then more easily traversed by the meningococcus.—A. Crompton, L. ii./17,14.

Lumleian Lectures. Epidemiology. Mode of spread of infection. Path of meningeal invasion. Clinical forms—a very exhaustive paper.—Sir H. Rolleston, B.M.J. i./19,406,536.

Meningo. Carriers, Study of.—D. Embleton and co-workers.—L. ii./19,679.

Older General References.

An epidemic of the disease occurred in New York 1904–1905 and was responsible for great mortality.

Antipyrin, Phenacetin, and Opium are useful. Hydrotherapy in the form of the tub bath at 98° is recommended by Aufrecht. All cases bear stimulants well.

A paper on cerebro-spinal meningitis in the Northern Territories of the Gold Coast. No drug seems to have any specific effect. Calomel and a counter-irritant in the form of Liquor Iodi or Liquor Epispasticus over the cervical spine gives some relief to the headache. Cardiac tonics advisable, Phenacetin and Caffeine if temperature unduly high. Chlorodyne gives great relief. Spinal puncture and removal of as much fluid as will pass away gives relief. Further points on diagnosis are given. Steps and precautions to prevent spread of outbreaks.—L. ii./08,1218.

Repeated lumbar puncture and injections of Lysol (1% Solution used) or one of the Silver Salts, or even permanent drainage of the spinal canal recommended as therapeutic measure.—L. i./07,478; L. ii./08,478

Flexner's Official Report on the epidemic.—B.M.J. ii./06,1023.

Introduction by spinal injection of a highly immune Serum obtained from the blood of patients recovered from the disease injected with their own serum taken on the sixth or seventh day of illness has been used as curative agent. Suggested use similarly in trypanosomiasis.—B.M.J. i./09,1177.

Melton Mowbray and Nottingham outbreaks in the summer of 1910. While there is immense variation in quantity of attacks the general ratio of deaths to attacks is very high and serious sequelæ are always to be expected—on the other hand a large proportion of the community appear to be immune. —B.M.J. ii./10,666.

Bacteriology and Diagnosis.—A diplococcus, evidently *Diplococcus intracellularis meningitidis* (Weichselbaum), has been isolated from the cerebro-spinal fluid, and from the brain membrane, and the purulent exudate. It has been found in the nose in coryza and in rhinitic and otic discharges, and so it may be advantageous to resort to periodical ablutions of the nasal and buccal passages of the sick and their attendants. The organism resembles the gonococcus *M. catarrhalis, M. flavus*, etc. in morphology, in being intracellular, and in its non-staining by Gram's method. The organism requires special media for its cultivation and is recognised by its growth, sugar and agglutination reactions. It will not grow at a temperature below 25° C. and without precautions against drying it will die out even at 37° C.

The organism is grown on **Nasgar Medium** (*v. M. Gonorrhœa, Vol. II.*) or preferably on Gordon and Hine's **Trypagar.**

Gordon's Memorandum on cerebro-spinal meningitis to the L.G.B. Characters of the *Meningococcus* detailed. *M. Catarrhalis* likely to be confused with it.—L. i./07,598.

Still's Diplococcus. Still's organism is thought to be only a variation or attentuated form of Weichselbaum's Coccus.

"Chocolate" Medium made by heating 3 pts. of defibrinated bullock's blood with Trypsin Agar and 1% Glucose until it becomes a glossy opaque solid medium of chocolate colour. Results of cultivation of the meningococcus more successful than those with Serum—trypagar medium and others. H. W. Crowe, L. ii./17,201.

West's Swab for taking swabbings from the posterior wall of the pharynx consists of a wire in a bent glass tube and resembles Bellock's sound in glass instead of metal. These obviate the use of a tongue depresser. Inoculations are made *direct* onto Nasgar Medium and grown for 24 hours. Likely colonies can be cultivated on plates and incubated at 37° C. and at 23° C. Colonies growing at 37° C. and not at 23° C. and having the requisite appearance are taken as meningococci. (N.B.—Whatever medium is used cultures must always be prepared immediately).

The combination of either rash or vomiting, squint or rigidity of limbs, and opisthotonos, with a clinical picture otherwise resembling Influenza is very strongly suggestive of the graver disease.—E. Hobhouse, B.M.J. i./15,419.

When the characteristic organism is easily found (intracellular) in smears in the cerebro-spinal fluid either in the 1st, 2nd or 3rd attempt it is of grave prognostic import. List of symptoms.—M. Foster, B.M.J. i./15,543.

Diagnosis depends to a very great extent on realising there are three distinct stages of the infection, viz.—(1) Catarrhal, (2) Septicæmic, (3) Meningeal.—A. Lundie, D. J. Thomas, and S. Fleming.—B.M.J. i./15,466.

E. C. Hort maintained by means of liquid cultures grown at room temperatures and warm stage experiments that this organism is an ascospore derived from a giant meningococcus by process of endosporulation.—B.M.J. ii./17,377.

Mycologist's criticism of Hort's view that this is the spore of an ascomycetous fungus.—J. Ramsbottom, B.M.J. ii./18,204. Reply *ibid.* 269.

A swabbing from the throat in the first or catarrhal stage almost invariably shows presence of a streptococcus. The primary invasion of the mucous membrane is thought to be a streptococcus which prepares the way for the

entrance of the more delicate meningococcus and should the meningococcus settle on a throat like this the way for further advance is facilitated. Subsequent stages are the septicæmic and the meningeal. Potassium Permanganate 1 in 1000 as spray in the catarrhal stage. Flexner's serum in the second and third. As much spinal fluid as will run out spontaneously—may be 100 Cc. is removed and a smaller quantity usually 30 Cc. of serum given. (The resultant must always be less than the original pressure).—A. Lundie, D. J. Thomas, S. Fleming and P.W. MacLagan.—B.M.J. i./15,836. See also L. ii./15,693.

Lymphocytic meningitis. Cases in which with acute symptoms are just like those of cerebro-spinal fever, the cerebro-spinal fluid though under high pressure contains no polymorphs and no meningococci but lymphocytes in excess. Never fatal.—W. P. Herringham, B.M.J. i./17,832.

Effect of culture media on agglutination of meningococci. Individual strains of meningococci when grown on nut Nasgar media become more agglutinable than when they are grown on legumen agar, with or without the addition of blood.—I. Walker Hall and G. E. Tilsley, L. ii./21,494.

Sugar (reducing Fehling's Solution) is absent in the acute stage, but may return in some degree as the infection recedes. *Cf., Vol. II.*

Treatment and Disinfection of Carriers.

Inhalation (? spray) composed of Iodine 12 Gm., Guaiacol 2 Gm., Thymol 0·5 Gm. Alcohol 200 Cc. with Potassium Iodide 6 Gm. used five or six times a day. Swab the throat out with a 3 to 5% solution of Iodine in Glycerin. Used in the French Army.—Sir Wm. Osler, B.M.J. i./15,189.

Bathing of natives in East Africa exposed to infection in 1 in 400 Cyllin. Clothes in 1 in 200. Also Soamin 5 grains intramuscularly on alternate days—this thought to be secreted in the cebero-spinal fluid and to have deterrent effect on the growth of the organism.—E. N. Butler, L. i./15,692.

Repeated lumbar puncture even in severe cases with removal of from ½ to 1 ounce cerebro-spinal fluid. Excellent results—better than serum.—M. Foster, B.M.J. i./15,543.

Spraying with **permanganate** (1 in 1000) of some service in treatment. Characteristics of epidemics.—B.M.J. i./15,494,836.

Disinfect all articles likely to be contaminated by discharge with 5% Cresol. —B.M.J. i./15,521.

Lumbar puncture combined with irrigation of spinal canal with normal saline of value. Serum 10 to 30 Cc. injected after removal of spinal fluid. Soamin not without danger.—F. E. Batten, L. i./15,964.

Navy 163 cases. 54% fatal. Lumbar puncture, serum and autogenous vaccines given.—Surgeon General Rolleston, L. i./15,909.

Tartar Emetic ½ grain doses intravenously following on Sir L. Rogers' use of it in Kala Azar. Temperature fell to normal in 60 hours. Headache disappeared.—S. Neave, L. i./16,1101.

Zinc Sulphate 1·2% as a steam spray or 1% Chloramine Solution directly applied for treatment of 'carriers.'—M. H. Gordon and M. Flack, B.M.J. ii./16,673,695.

Antimeningococcic Serum of the Lister Institute.

Dose.—30 Cc. given at the earliest possible moment and repeated daily for at least 4 days except when less than this amount of cerebro-spinal fluid can be removed.

Intrathecally and intravenously successful. Types I. and II. of the meningococcus of Gordon isolated.—F. W. Andrewes, B.M.J. i./16,689,728.

Sixteen cases by lumbar puncture. Vaccines 250 million subcutaneously at the time of first dose of serum. 2nd dose 500 million increased to 2000 million.—C. Worster-Drought, B.M.J. ii./16,689.

For the purpose of standardising antimeningococcic serum, endotoxin of the meningococcus extracted by a modified Besredka's method.—M. H. Gordon, B.M.J. i./18,110. *See* also *ibid.* ii./18,335.

In the war, at first no serum seemed to have any effect. Ellis in France and Gordon at home differentiated the strains and serum became more efficacious.—Sir W. Herringham, B.M.J. i./19,20.

Meningococcus carriers treated by **Flavine** spray preceded by Adrenalin 1 in 6000 in Normal Saline. Chloramine irrigation better than flavine.—F. J. Cleminson, B.M.J. ii./18,51.

FR.CX. SUPP. 1920 states, the receptivity of animals being extremely variable, it is impossible to determine by tests, its therapeutic activity.

CONFERENCE ON STANDARDISATION. Great Britain, America, France, and Germany all adopt different methods at present. Further work to be carried out.—L. ii./22,1294.

Flexner's Serum. — Used intra-spinally, subcutaneously useless. Intra-spinal injection is made under chloroform. A rigid and comparatively large trocar is used. After puncture as much fluid as will do so is allowed to run out. If the amount of fluid is not great it can often be increased by raising the patient's head and shoulders.

Dosage.—If the case is very severe, and especially if pus is found in the fluid obtained by lumbar puncture, 30 Cc. or larger doses to be given every day for three days; (in one case 70 Cc. were injected within 20 hours after admission, with apparently good results). In cases not so urgent better not repeat the injection until after 48 hours. In this way only can the effect of the smaller dose be estimated, as the full effect of a single injection is not always apparent until after 48 hours, or longer. Sometimes a single injection of 30 Cc. is valuable. 210 Cc. have been given to a case intra-spinally.

Analysis of results. Lumbar puncture, drainage and intrathecal injection of polyvalent antimeningitis serum the most useful treatment. Phenol, Lysol, etc. injections do harm.—A. Gardner Robb, B.M.J. i./17,478.

The serum available at the beginning of the epidemic on the Western Front, largely of American origin, was found of little value in treatment, but that prepared during 1915 from a due admixture of current epidemic strains proved of considerable curative potency.—E. W. Andrewes, B.M.J. i./17,830.

Cerebro-spinal Fever in the Navy, August 1st, 1915 to July 31st, 1916. Treatment by means of Sera, Flexner's, Gordon's, etc. Some received in addition to Soamin, Hexamine and Vaccines. Intrathecal injections with the serum show the largest percentage of recoveries.—H. D. Rolleston, L. i./17,54. Flexner's gave the best results.—L. i./18,87

Cerebro-Spinal Fever Micrococcus Vaccine.

May be found of service in cases of acute cerebro-spinal fever, especially if a suitable anti-serum is not available. An initial dose of 50 millions may be repeated at intervals of two or three days, or increased at each rise of temperature.

Ampoules contain 5, 10, 25, 50, 100, 250, 500 and 1000 millions.

Might be of service in affections of the eye due to epidemic cerebro-spinal meningitis.—Oph., Jan., 1911,70.

For Cerebro-Spinal Fluid, Examination of, vide Vol. II.

Cholera.

The disease is marked by the presence of the *Spirillum choleræ*.

Anti-Cholera Vaccine.—As an immunising agent only; it does not appear to possess any curative properties. A *dose* of 500 millions may be followed by constitutional disturbance, local redness, pain and swelling of the corresponding lymph glands, effects which should pass off within three days. A dose of 1000 millions should be given five or six days later and will probably produce less reaction. This dose should be repeated or doubled after a further 7–10 days. Full immunity is reached about a week later and persists for about one year.

Cholera and the Dardenelles. In the Balkan wars there were probably 30,000 deaths. The fate of the Turks after Lule Burgas teaches that in a few days unchecked cholera may inflict more loss than months of shell fire.

From December, 1914, to September, 1915, in Austria there were 27,591 cases and 15,270 deaths.—General V. Ziegler died of it—the only man who refused to be vaccinated.—B.M.J. ii./15,760.

Inoculation was compulsory in the Austrian Army after cholera broke out in the Serbian campaign. 1 Cc. of an emulsion of dead cholera bacilli was given subcutaneously and repeated 4 to 6 days later.—B.M.J. i./16,65.

Cholera inoculation was discussed at the German Medical Congress, Warsaw, 1916 (B.M.J. i./16,27). There was difference of opinion as to the probable duration of resultant immunity. For military purposes *double* inoculation (Cholera and Typhoid) was practised in urgent times—the cholera to be repeated in 6 months, the typhoid in 8.—B.M.J. i./16,192.

Treatment of Cholera in Calcutta.—L. ii./17,29.

Prevention and treatment by saline transfusion. See Normal Saline Solution, pp. 743, 744.

Cholera in Russia.—L. ii./18,113.

Castellani has inoculated against Cholera with his Combined **Tetra-, Penta-, and Hexavaccines**, *q.v.* p. 931.

The prophylactic Vaccines of **Haffkine** have been used with success in India by employing a growth of the spirillum, the virulence of which has been increased by growth in the peritoneal cavity of guinea-pigs. They are:—

(1). Weak. (2). Strong. The dose of these preparations is 1 Cc. The second is injected 3 to 5 days after the first (the weak) one. They have to be freshly prepared.

Cholera vibrios may enter and live in the bile. Out of 271 fatal cases at Puri in 1912, the vibrio was cultivated from the bile in 80 cases. From the stools of 34,461 persons, travellers from cholera infected localities, vibrios were isolated in 63 instances, of which 23 agglutinated and 40 did not. Of the agglutinating vibrios all liquefied gelatin, gave the Pfeiffer reaction and were positive to the fixation test, several did not yield Indol and were non-virulent to pigeons, only two were non-hæmolytic. Of the non-agglutinating vibrios none gave the Pfeiffer reaction and only three gave a doubtful fixation; several were hæmolytic.—Review of Tropical Diseases.—Pr., Aug., '13,218.

A comprehensive report on recent advances in knowledge of cholera.—Lt.-Col. J. H. T. Walsh, T.D.B. 18/21,69.

Fish or shellfish origin of cholera in London in 1854. Need of regulating sale of small fish from shallow areas.—W. H. Hamer, L. ii./22,763.

A para-cholera vibrio isolated from several cases.—T. Kabeshima, T.D.B., Vol. 19, 1922/738.

'Appalling' death rate of cholera in Mesopotamia—40%. Probably a large percentage was bacillary dysentery. Dilute rice water instead of milk diet and Magnesium Sulphate, enough to get several motions, and on no account Opium. This procedure was effectual.—Lieut.-Col. Henry Smith, B.M.J. ii./22,1049.

House infection in cholera. Statistical Investigation found of value in India.—Lieut.-Col. A. G. McKendrick, B.M.J. ii./22,1266.

Cholera epidemic in Russia. Encouraging figures under American Relief Administration.—L. ii./22,306,421.

Pilgrims and cholera. The religious Fairs and Festivals have a sinister influence.—L. ii./22,673.

During the first 6 months of 1922, 29,264 cases occurred in the three Soviet Republics of European Russia, 4,963 in Caucasia and 1,864 in Asiatic Russia.—B.M.J. i./23,971.

Precautions against cholera in Roumania. Isolation of persons from infected parts of Russia.—L. i./23,46.

Alkaline Starch Medium for isolating **Cholera Vibrio from faeces** in the case of Carriers.

The cholera organism alone of all the intestinal organisms acidifies starch (M. H. Gordon). Emulsify Powdered Agar 30 Gm. with cold water 250 Cc. Emulsify separately Peptone 10 Gm. and Sodium Bicarbonate 1·5 Gm. in a further 250 Cc. of water. Mix and add water 500 Cc. Dissolve in the steamer, clear with egg and filter. Emulsify Potato Starch 10 Gm. in some of the (cooled) medium and add to the rest. Sterilise by the fractional method. Add Litmus solution to make it blue. Cholera colonies acquire a faint pink more quickly (24 to 26 hours) than the allied vibrios.—H. Graeme Gibson. B.M.J. ii./16,454. For isolation from water see *Vol. II.*

For further references *vide* Previous Editions.

Cold Vaccine *See* **Catarrh.**

Anti-Colon Bacillus Serum. *Dose.*—10 Cc. or more. Is prepared from horses which have been immunised against a number of types of *B. coli* principally from cases of peritonitis and puerperal fever. Supplied in 25 and 50 Cc. vials.

The action of this serum is chiefly bactericidal, though also possessed of antitoxic properties.

In acute *B. coli* infection of the kidney, Dudgeon has advised 25 Cc. of the Serum daily for three days, combined with Calcium Lactate to avoid rashes, joint pains, etc., better in his opinion than vaccines.

Investigations on *B. Coli* showed conclusively that these micro-organisms vary in each host; and that probably there are many species which exhibit the same microscopical and cultural appearances.

Colon Bacillus Vaccine is used in the treatment of post-surgical suppuration in abdominal cases, such as sinuses which refuse to heal after operations upon the appendix, gall bladder, kidney, or intestines; also in bacilluria complicating tubercular cystitis, in the nephritis of pregnancy, and in endometritis, when due to infection by *B. Coli.* Initial doses of 5 million organisms may be repeated at intervals of 7–10 days, and may be gradually increased till 100 millions or more are being given. If the doses employed cause any disturbance of the general conditions as evidenced by rigors or rise of temperature this must be taken as indication either of pus under pressure or if not this, for diminished subsequent dosage.

Discharging sinuses should, if possible, be kept open, as closing is likely to result in rigors and severe constitutional disturbance.

Immunisation of the patient 3 to 4 days prior to abdominal operations in cases where the presence of pus is suspected is to be advocated—for this purpose a dose of 500 millions may be employed.

In cases of bacilluria the urine should be kept well alkalinised by full doses of Sodium Citrate or Sodium Bicarbonate.

Ampoules contain respectively 10, 25, 50, 100, 250, 500 and 1,000 million organisms.

Vaccine treatment of *B. Coli* infections of the urinary tract is commonly practised with generally favourable results.

Appendicitis 22 cases with anti-colon B. Serum 20 Cc. dose and vaccine 100 million a few days later.—A. Cowan Guthrie, B.M.J. i./15,67.

Arthritis treated by B. Coli Vaccine intravenously—"non-specific therapy." —Miller and Lusk, Jl. Am. Med. Assn.. Jan. '16.1756, see also B.M.J. i./18,196.

Rheumatoid arthritis treated by Bacillus Coli Vaccine *intravenously*, 50 to 200 millions for first dose, with patient in hospital. Rise in temperature a few hours after injection (100 or 103° F.). Subsequently up to 500 million or more given. The method thought, at least, to be an adjuvant to more recognised methods.—R. J. Perkins and C. B. White, B.M.J. i./23,411.

Colon Bacillus, Streptococcic and Staphylococcic Vaccine.

B. Coli may help Streptococci and Staphylococci in causing puerperal septic conditions. It is thought that if *B. Coli* is found inside the uterus it has been conveyed there by the examining hand,—even with the greatest care it is impossible to sometimes avoid infecting in this way. It would be impossible to infect a patient with Streptococci only. The above Vaccine is, therefore, useful as avoiding the delay in making an Autogenous Vaccine. Latter gave good result.—B.M.J. i./12,13.

Hay fever treated by Autogenous *B. Coli* Vaccine, *see* **Hay Fever.**

Diphtheria Antitoxin, Serum Antidiphthericum, P.G., U.S., &c.

This serum combats the disease in the human subject.

It retains its activity for 10 months if kept in a cool and dark place.

The loss in unitage may be about 10% *p.a.* in indifferent storage conditions. —A. T. McConkey, B.M.J. i./17,10.

Dose.—*Diphtheria antitoxin should be stocked in phials containing* 8,000 *units for treatment and* 500 *units for prophylaxis; the former should be concentrated serum containing the* 8,000 *units in less than*

10 *Cc. A curative dose can then be given in one injection with a* 10 *Cc. syringe. In the case of a prophylactic dose the* 500 *units should not be contained in less than* 2 *Cc. It is seldom safe to rely on any dose of less than* 8,000 *units, whatever the age of the patient may be : larger initial doses—e.g., from* 16,000 *to* 30,000 *units—are specially required when the administration of antitoxin has been delayed until the third or fourth day from the onset of the attack.—Ministry of Health Memorandum* 1922. *The immunity caused is claimed to last for* 3 *weeks. The antitoxin may be warmed by standing in water at* 40° *C. for* 10 *minutes before injection. Avoid injecting air. Give the dose at once without waiting bacteriological diagnosis. Use a sterile glass syringe with small needle. Cleanse skin with ether soap and inject in the flank or between the scapulæ.*

In one sense, too much cannot be given; one cannot poison a person with it by an over-dose as with Morphine or Strychnine. *Give subcutaneously,*—intravenous injection is not easy in all cases.

The **number of immunising units** contained per Cc. varies in the different pharmacopœias and with different manufacturers. Antitoxin units discussed at Conference on Standardisation (Paris). The **Erhlich Standard Unit** should be considered as the international standard. —L. ii./22,1294.

We deal with this matter further in Vol. II.

By injecting **intravenously** the toxin circulating in the blood is said to be more effectually and rapidly neutralised.

The Antitoxin is sometimes given *per anum* and *per os*, but opinion is, in general, against its administration by these channels.

U.S. has **Serum Antidiphthericum** with potency of not less than 250 Antitoxic Units per Cc. and *Average Dose*, Hypodermic 10,000 units ; Protective 1,000 units; also **Serum Antidiphthericum Purificatum.** *Syn.* **Concentrated Diphtheria Antitoxin,** Antidiphtheric Globulins with the same potency and dose. Both are preserved with not more than 0·5% Phenol or Cresol. This purification by the removal of the unrequired serum albumen may reduce the untoward serum rashes which frequently occur with ordinary Antitoxin.

P. Jap. IV. Liquid Serum is 500 Ehrlich units in 1 Cc.

In addition to the liquid sera, **Dried Serum** (U.S., F.E., P.G. P. Jap IV.) in amber coloured scales is manufactured by evaporation at a temperature not exceeding 40° C., or by means of Sulphuric Acid *in vacuo*. This is more suitable for export. The scales are dissolved in sterilised water. It is not soluble in hot water (above 50° C.), nor in alcohol. The directions given by each maker should be followed.

As higher potencies are now used than formerly, and the quantity of serum injected is therefore less, rashes, pain and swelling which sometimes result, are less frequent. Calcium chloride is said to relieve the rash, pain, &c.—Hewlett.

For brief extracts from the (earlier) literature on this Antitoxin and notes on **Serum Rashes, Untoward Results and Diphtheria Carriers, Diphtheria Endotoxin** and **Toxin-Antitoxin,** see *Vol. II.*

Large initial doses of antitoxin given as early as possible are successful in diphtheria.—R. Davison, B.M.J. ii./21,918.

The child requires as large a dose of Antitoxin as the adult. Intramuscular injection best, deeply into the vastus externus, not the gluteal region. Not less than 6,000 units. Importance of the recumbent position in bed in treatment—not even a pillow should be allowed for a minimum of 3 weeks.—F. H. Thomson, L. ii./21,69.

Intravenous injection of Diphtheria Antitoxin. Give it slowly. It should be the method of choice.—Poul Iversen, L. i./23,694.

DIPHTHERIA PROPHYLACTIC (TOXIN-ANTITOXIN MIXTURE—*see also Vol. II.*) 1 Cc. doses—utility of questioned.—H. Cooper, B.M.J. ii./22,1244, but now definitely believed in and used in America and elsewhere.

Diphtheria toxin, pretended to be spermin, for therapeutic purposes. used for murder.—L. ii./21,1066.

PROTEIN-FREE DIPHTHERIA ANTITOXIN. Method of preparation.

The antitoxic serum is saturated with sodium chloride, two vols. of a saturated sodium chloride solution are added and then trichloroacetic acid as long as a precipitate, of protein and antitoxin, forms. This precipitate is filtered off and triturated with water which dissolves out the antitoxin, giving a solution practically protein free. This procedure has been employed for preparation of a protein-free toxin from the spinal marrow in case of tetanus.—J.C.S.A. 1922, i. 1216.

The tooth brush as a carrier of virulent diphtheria bacilli. Immersion for 1 minute in a 5% solution or for 5 minutes in a 2% freshly prepared solution of standard Lysol found insufficient to kill B. diphtheriæ on artificially infected tooth brushes.—G. H. Culverwell and J. Graham Forbes, L. ii./23,255.

Intraperitoneal injection of diphtheria antitoxin—particularly advocated in advanced cases in which the intravenous method cannot be employed.—L. ii./23,994.

Diphtheria Bacillus Vaccine has been advocated as an adjuvant to antitoxin in cases where the *B. Diphtheriæ* tends to persist in the throat after convalescence. The initial dose of 25 millions may be repeated in 7 or 8 days; subsequent administrations up to 500 millions are to be controlled by bacteriological examinations of the infected parts. **Ampoules** contain 10, 25, 50 and 100 millions.

An autogenous Vaccine seems to be of definite value in removing membrane, getting rid of nasal discharge, and hence greatly reducing the infectivity of membranous rhinitis, but Vaccine does not appear to be capable of completing the work of elimination after the membrane has gone.—L. i./12,294.

The action of *Radium Rays* on Diphtheria Toxin has been discussed. See Radium *Vol. II.*

Dysentery.

The Lister Institute supplies **anti-dysentery serum** consisting of the serum of horses which have been immunised against the dysentery bacillus (Shiga, Kruse, Flexner, Duval, etc., types). It is preserved with Phenol 0·3%, in 20 Cc. vials.

Dose.—Preventive 20 Cc. subcutaneously; curative from 20 Cc. upwards subcutaneously according to severity. For a grave case 50 Cc. In very grave 80–100 Cc. For a child half these doses. Intravenously not more than 50 Cc. at one time. Stools are stated to return to normal rapidly in successful cases, but treatment to be continued. Pains and temporary rashes may result, which need, however, not alarm.

Keeping Properties. This serum appears to retain its 'toxin'-neutralising power for at least 1½ years, the dry powdered Shiga B. being used as test toxin.—A. T. McConkey, B.M.J. i./17,11.

SERUM ANTIDYSENTÉRIQUE FR. CX. SUPP. 1920, is obtained from horses immunised with B. dysenteriæ (Shiga). Exact tests for its antitoxic power are provided.

Dysentery Serum. CONFERENCE ON STANDARDISATION (PARIS). Outline of further work on toxins.—L. ii./22,1294.

Multivalent Antidysenteric Serum 80 Cc. in the flank in severe or 40 to 60 Cc. for mild cases. In 'fulminating' cases much larger doses assisted by

Magnesium Sulphate 1 drachm three times daily for the first few days then reduced amount.

In bad cases Morphine needed and for very severe tenesmus a suppository containing Cocaine ½ grain and iodoform 3 grains is useful.

Rectal lavage with 1 in 1000 Copper Sulphate and Mist. Simarubæ often benefits chronic cases. Generally there is distinct rise in temperature within 12 hours of injection which may last 48 or 72 hours. Good prognostic sign.—J. B. Fisher, B.M.J. i./17,43.

Having formed an opinion on clinical and bacteriological diagnostic grounds that the case is bacillary dysentery, give 100 Cc. antidysenteric serum intravenously without delay followed if necessary by a second dose within 24 hours. In a percentage of cases, however, patients do as well on Saline purgatives.—G. A. Finlayson, B.M.J. i./17,46.

Bacillary dysentery in the Royal Naval Division was found to be more often in the proportion of 8 to 1—due to Flexner's than to Shiga's Bacillus—contrary to the general experience in Gallipoli but the conditions of examination were not strictly comparable. Surg-.Gen. H. D. Rolleston, B.M.J. i./17,258. See also *ibid.* ii./17,539.

In the ***Salonica Forces,*** dysentery was hardly less in importance than malaria. No figures are available to show the relative frequency of the amœbic and bacillary forms. The *latter* was the dominant form, and though amœbic cases were present throughout, it was only late in the season of 1917 that the extent to which this form (the amœbic) prevailed came to be recognised. Evidence of a widespread amœbic infection in its most insidious form, carried about by apparently healthy people, finally accumulated.

The opinion expressed early in the same year by Lieut.-Col. Graham (L. i./18,51) that less than 3% was of amœbic type had therefore to be reconsidered in light of later knowledge.—Col. A. G. Phear, Proc. Roy. Soc. Med., Vol. XIII., 1920, pp. 57–100.

Serum Treatment of Bacillary Dysentery.—B. G. Klein, L. ii./19,775; W. E. Waller, *ibid.* 778.

Bacillary Dysentery.—Med. Res. Com. Report on—reviewed, B.M.J. ii./19, 283.

Vaccine B. Dysenteriæ.

Dose for prophylaxis 250, 500, 1000 mill. at intervals of 7 to 10 days. Initial dose for treatment 5–10 millions.

For immunisation and treatment, practically atoxic; supplied in ampoules 50, 100, 250, 500 and 1,000 millions.

Production of immunity against Dysentery Toxin. Bacterial Toxins, *e.g.*, that of dysentery, slowly lose their toxicity in presence of pepsin. Repeated injection of bacillary emulsion so digested confers a very high degree of immunity. A rabbit which had received 3 injections, received seven days after the last, 20 times the minimum fatal dose of untreated emulsion, without any symptoms whatever. Immunity is produced rapidly,—in six days animals are immune to six times the fatal dose. The method is painless, the animals are not ill and the process is innocuous.—Ruffer.

Communication of diarrhœa. History of number of cases suggests that it is a communicable disease, the infection of which is capable of being conveyed to healthy persons in the excrement of the sick.—P.R.S.M., Epid. Sectn., Mar.,'10, p. 111. Infection by flies thought to explain spread of.—Apl.,1910,131.

The relation of flies to summer diarrhœa is practically based on epidemiological and other circumstantial evidence, since the specific cause of this disease has not yet been determined with certainty.—Na., July 21, 1910. *See* also B.M.J. i./13,7.

Directions for preparation of Dysentery Vaccine including experiments demonstrating that the toxicity of an emulsion of B. Dysenteriæ can be reduced or entirely destroyed by dilute hypochlorous acid (1 in 1000 dilution of Eusol) or Hydrogen Peroxide and that the injection of an emulsion of this kind in which the toxin has been destroyed produces a satisfactory degree of immunity.—H. R. Dean and R. S. Adamson, B.M.J. i./16,611.

For details concerning differential diagnosis of Bacillary and Amœbic Dysentery and other Bacteriological data see Vol. II.

Endemic Goitre in certain parts of India, is held by McCarrison to be due to intestinal intoxication. He has followed this up by treating patients with Vaccines prepared from mixed cultures of all the coliform organisms grown from the fæces. Initial dose of 150 millions increased at intervals of one or two weeks to 350 or 500 millions. From four to seven injections being required in most cases. Needs of the body in Iodine, greater in presence of pollution of food and drink than in its absence. Perfect cleanliness is as effective as provision of additional supply of Iodine in food. Gastro-intestinal infection favours goitre. Intestinal antiseptics should be curative. Perfect hygience of the bowel essential. At the Roy. Mil. Asylum, Sanawar, India, goitre incidence of 23% reduced to 2% simply by installation of good water supply. It contained *no* Iodine. Where goitre arises despite these measures, Iodine intake assumed insufficient.—R. McCarrison, B.M.J. i./24,989. See also our pp. 699, 749 and Therap. Index.

Gonorrhœa.

State Control of Venereal Diseases.—Gonorrhœa accounts for at least three times as many of the annual 500,000 fresh infections with venereal disease as syphilis—*See also* **Venereal Diseases Act, 1917,** *this Vol.* and *Syphilis, Vol. II.*

Gonococcal Vaccine. Supplied in sealed ampoules containing 10, 25, 50, 100, 250, 500 and 1,000 million Cocci respectively. '**Neisser Bacterin**' is a similar Vaccine.

In preparing the Vaccine, cultures are taken from cases suffering from a severe first attack, which has been untreated by antiseptics.

Dose.—In acute urethritis and such complications as prostatitis, vesiculitis, epididymitis, the initial dose is 5 millions, and by judicious use of the vaccine the duration and severity of the disease may be materially shortened. In conjunctivitis and iritis (initial doses 250 millions) and arthritis (initial dose 100 millions) it is stated to be specific. The diagnostic dose in cases of arthritis of doubtful origin is 500 millions (*vide* Streptococcus Rheumaticus vaccine).

A series of injections will certainly free any case of chronic gleet from the gonococcal infection, although it may not succeed in stopping discharge entirely in all cases owing to secondary infections.

Initial doses may be repeated at intervals of 7 days, and gradually increased until a maximum dose of 500 million organisms has been attained. Some cases receive benefit from the injection into the urethra night and morning of an ounce of a liquid culture of Lactic Acid Bacilli.

Hale White, P.R.S.M., Oct., 1910, described two cases in which gonorrhœal complications were cured by vaccine treatment.

The injection of gonococcal vaccine usually gives rise to a reaction, which may be local or general. The *local reaction* consists in redness and swelling at the site of injection. The *general reaction* is manifested by a rise of temperature accompanied by increased pain and tenderness in the affected joints (in the case of gonorrhœal arthritis). Both reactions usually subside within twenty-four hours. The reactions are said to be less marked after small than large doses, and to be absent in cases free from gonorrhœa.

In the acute stages of gonorrhœa, provided the disease is localised to the urethra, vaccine treatment is unavailing; the same holds true in almost all cases of uncomplicated chronic urethritis. Gleet resists ordinary treatment because the prostate is the seat of mischief, the place so to speak where the gonococcus lurks, therefore, if this gland is massaged every other day for a minute or so by inserting a finger per rectum all the secretion is squeezed out, consequently if an injection of Silver Nitrate 1 per cent. or Copper Sulphate 5 per cent. be now given, the prostate, acting like a sponge, absorbs the solution, which kills the organisms, and a gleet which has persisted for months or years may not infrequently be cured in a fortnight.

Two cases of gonorrhœal iritis did well. It is interesting to note that gonococci could not be found in the plastic lymph recovered from the anterior chamber of one of these patients, although they could be found in the associated gleet.—Oph., Jan., 1911, p. 68.

Good results in gonorrhœal arthritis and in gonorrhœal vulvo-vaginitis in children.—L. ii./11,1626.

In gonococcal arthritis administration of dead gonococci exerts no curative influence,—it is thought to be valueless as a practical clinical treatment. Results in 9 cases. Theoretically also this authority cannot agree. Increased susceptibility he says is one thing, the power of recovery from it is another and it is far from certain that the latter can be conferred in all or even many diseases by injecting the corresponding dead bacteria under the skin. The preceding is not a general law. In bovine tuberculosis it has failed. In staphylococcic infection in human medicine there is evidence of curative power. In the case of the gonococcus even the living germs can produce little or no general immunity, and no antibodies are known in man, hence cure by dead organisms is still more unlikely. Diagnostic reaction also varies very much.—Ralph Stockman, B.M.J. ii./11,1466.

Vaccine treatment does not cut short the acute stages of urethritis, but gives good result in gonorrhœal arthritis. Stock Vaccine (polyvalent) practically as good as autogenous.—Majors Pollock and Harrison, B.M.J. ii./12,1143.

Gonorrhœal warts on the face which had resisted ordinary treatment for a year successfully treated with Vaccine.—W. E. M. Armstrong, L. i./13,1382.

Small doses given at short intervals are preferable to large doses at longer intervals.—Pr., July, '13,120.

W. Murrell on the other hand considers auto-vaccines of greater value than those from unknown sources. Surgical ministrations necessary in addition.—Pr., Jan., '12,44.

Detoxicated Gonococcic Vaccine. (Thomson's).

This vaccine was submitted to considerable clinical trial (in 150 cases) and it is considered the most logical scientific and effective way of treating gonorrhœa and its complications. Even in doses of 2,500 up to 10,000 mill. no such thing as a negative phase was produced. No other form of vaccine, sensitised or otherwise, produces such rapid and specific reaction. The vaccine is practically non-toxic. Cases must be treated locally as a surgical condition with vaccine as adjunct, and the dose regulated according to serological results. There is less tendency to relapse as the patient has circulating in his blood for several months sufficient antisubstance to protect him. Should be of great value in the female where local treatment is so limited.—D. Lees, L. i./19,1107. (For a general description of Detoxicated Vaccines see p. 941).

Antigonococcic Serum (Nicolle's) subcutaneously and intraperitoneally, *not* intravenously, used with success.—F. Ivens, B.M.J. i./21,77.

Metastatic gonorrhœa. Opening remarks in Discussion before the Soc. for Study of Venereal Diseases. Question as to use of Broughton Alcock's method of using live gonococci intravenously.—Sir T .Horder, L. i./23,1304.

In inaccessible regions, as in gonorrhœal salpingitis, vaccines, detoxicated or otherwise, essential.—D. Lees, B.M.J. i./23,242.

Gonorrhœal prostatis and vesiculitis. Vaccines of value in some classes.—A. Cambell, B.M.J. ii./23,456.

Non-specific Protein (Milk) Injections in gonorrhœa—see p. 671.

Autogenous Vaccine of great value.—Sir W. Willcox, L. i./23,1314.

Autogenous vaccines of higher value than stock vaccines. It does not matter how small a dose is given at first, it can easily be increased rapidly until there are signs that the vaccine is taking effect. In gonorrhœal rheumatism care should be taken not to increase the dose by too large an amount daily—the regular emptying of the prostatic focus, and massage every 5 days, the best form of treatment.—Maj. A. T. Frost, L. i./23,1314.

Hay Fever.—

Hay fever is caused by a soluble toxin which is innocuous to normal individuals. Dunbar showed in hay fever patients the occurrence of some of the reactions associated with the production of immunity,—namely, a specific precipitation of pollen extracts by the patient's serum and the phenomenon of complement deviation during the hay fever season. Pollen toxin is, therefore, a body capable of giving rise to the production of antibodies in animals and even in hay fever patients subjected to its action. Sufferers sometimes become cured spontaneously, *i.e.*, one assumes they have developed an active immunity against the toxin, but more usually they develop a condition of hyper-

sensibility, *i.e.*, becoming more sensitive each successive season. Experiments to determine what degree of immunity can be induced by inoculation of Pollen Toxin were undertaken at St. Mary's Hospital.

The inoculations were made, for obvious reasons, in the autumn, winter and summer, and it was found possible in every case to raise the patient's resistance to doses of the toxin by well regulated dose. An extract was prepared of the pollen of grass by Dunbar's method of extraction with distilled water, aided by freezing and thawing several times. These extracts are boiled for ten minutes after having been sealed in glass tubes. This treatment does not decrease their activity at all. The pollen of *Phleum Pratense, Poa Trivialis, Holcus Lanatus*, and *Agropyrum Caninum*, under test all gave the same reaction when dropped into the eyes of hay fever patients. Timothy grass (*Phleum Pratense*) perhaps yielded the most active extract. One gramme of this Pollen was extracted with 50 Cc. of Water, one drop of a five thousand fold dilution of this extract was sufficient to excite a distinct reaction in the conjunctiva of the most sensitive patients, whilst non-sufferers gave no reaction. A unit of Pollen Toxin was arranged (normal individuals had a resistance 20,000 compared with a sensitive patient 4) and the state of the patient's malady is thus known, and dosage can be calculated. Patients receive subcutaneous injections of, at first, very minute doses of Pollen Extract, at intervals of three or four days, then of a week or so. It was found by the ocular test that this method raised the patient's resistance to hay fever. It is shown that the sensibility of hay fever patients may be decreased by proper dosage at least a hundredfold, while excessive, or too frequent dosage only tends to increase sensibility.—L. i./11,1572.

Phleum Pratense appears to be the most potent of all the pollens of the grasses. Apparently this pollen extract will confer immunity against other pollens and conversely.

Initial dose.—A man giving a diagnostic reaction of 6 U.P. would receive 2 U.P. hypodermically, and one who reacted to 100 U.P would receive 33 U.P.

Subsequent dose.—About every week or ten days—large doses less often, small ones more frequently. The dose should be selected that will give the greatest increase in immunity as measured by the ophthalmo test—within limits. It will probably be safe to inject by 'rule of thumb,' but at any rate to make the diagnosis and fix dose a first ophthalmic test will be necessary. *In general the second and third doses may be half as much again* as the first, while the fourth, fifth and sixth may perhaps be twice as much as the first.—L. ii./11,814. See also L. i./14,1178.

Hay Fever Vaccine. Ampoules contain 25, 50, 100, 250, 500 'units.' Immunisation should be commenced in susceptible persons during February with an initial dose of 25 units :—subsequent doses as above with 7 to 10 days' interval. In treatment the initial dose may be determined by the ophthalmic reaction or failing this give 50 units initially.

A Hay Fever Reaction Outfit is also supplied for determining (*a*) whether a patient is susceptible to pollen toxin, (*b*) the degree of such susceptibility, (*c*) the dosage of pollen vaccine suited to any case.

HYPERSENSITIVENESS IN HAY FEVER, URTICARIA, AND ASTHMA.—Hay fever forms a good example of hypersensitiveness. The attack, instead of conferring immunity, renders the subject still more susceptible to the disease. For a number of years a person may suffer from a series of coryzas to which he does not attach much importance, then one day, when placed in an atmosphere of toxic dust, he suddenly finds himself in the throes of an asthmatic seizure. All people who suffer from hay fever are thought to be victims of hypersensitiveness. They have begun with hay coryza and progressed to hay asthma from a special hypersensitiveness to pollen and vegetable dusts.

Three conditions are thought essential for the production of hay coryza—1. The existence of a nervous temperament, hereditary or acquired. 2. A hyperexcitability of the nasal mucosa. 3. An external irritant.

Hypersensitiveness, hereditary or acquired, also explains a whole series of conditions, viz., those included under the term "arthritism." Urticaria also, is to be regarded as a sign of hypersensitiveness—there is scarcely a neuro-arthritic who has not, at some time in his life, had an attack, the causative irritant varying with the individual. Since antipyrin not infrequently causes urticaria in susceptible persons, Billard has employed this drug as a test of neuroarthritism, and finds that by administering it he can produce an urticaria in a large number of asthmatic patients. Moreover, urticaria may lead to asthma, just as hay fever leads to hay asthma. Hay coryza may indeed be regarded as an urticaria of the conjunctiva, and of the mucous membrane of the upper respiratory tract.—*Gazette des Hopitaux*, 2nd June 1910, per Glasgow Med. Jl., Nov., 1910.

Anaphylaxis, ***Papers on***—W. E. Dixon, B.M.J. ii./13,1351; G. Sims Woodhead, B.M.J. ii./13,1253; F. H. Teale and D. Embleton, B.M.J. ii./13, 1356; E. W. Goodall, B.M.J. ii./13,1358.

B. Coli associated with hay fever. A case of regular recurrence greatly benefited by Autogenous Vaccine of the *B. Coli* isolated from the pus obtained by washing out the antrum together with Calcium Lactate in large dose.—L. ii./12,1012.

Similar result may be obtained with organisms isolated from antrum, etc.

Alterations in the blood during Hay fever.—E. Emrys-Roberts, B.M.J. i./14,1176.

190 possible hay fever pollens in California.—L. ii./22,678.

True anaphylaxis, as distinct from immunity, depends on the distribution of antibody, probably a precipitin, between cells and body fluids.—Bayliss.

Anaphylotoxin. Anaphylaxis is generally agreed to be due to the formation of an antibody which combines with re-injected antigen. The symptoms are caused by the occurrence of this combination in the tissue cells. According to this view antibody in the blood is protective. Dale holds the theory which attributes anaphylaxis to antibody located in the cells.—H. H. Dale, B.M.J. ii./21,689.

Tuberculin subcutaneously has been found to relieve hay fever, *cf.* p. 882.

For a consideration of Cutaneous Tests, Reactions from, and Non-specific Protein Therapy in asthma, hay fever and numerous allied affections, see p. 662 *et seq.*

Influenza Bacillus Vaccine.

The Vaccine is of service in respiratory disorders due to this organism. It is, however, important to bear in mind that the organism only occasionally occurs alone; frequently it is accompanied by the *Pneumococcus, Streptococcus, M. Catarrhalis*, or *Bordet's Bacillus* of whooping cough. Bacteriological examination is necessary to determine the nature of the infection. Many cases of so-called "Influenza" are due to the *Pneumococcus, Streptococcus* and *M. Catarrhalis* either separately or together and in these cases the **Combined Vaccine for Colds (and Influenza)** is used. In influenzal septicæmia or endocarditis the initial *dose* is 10–25 millions, in true acute influenza 100–250 millions. Chronic influenza, especially if complicated by sinusitis or antral trouble, may persist for years if untreated, and very large doses of vaccine, 1,000 millions or more, may be needed for its cure. **Ampoules** containing 10, 25, 50, 100, 250, 500 and 1,000 millions are prepared.

The Combined Vaccine for Colds (and Influenza) described on p. 883 contains the Influenza Bacillus.

This vaccine has been widely recognised as a prophylactic and therapeutic agent in those susceptible to catarrhs involving the upper and lower respiratory tract. It is practically atoxic and there is no danger in its use in the presence of an epidemic or to those already acutely infected. In treatment the initial dose is 10 millions. For prophylaxis begin with 100 mill. and follow in 7 days with 250 millions and increase up to 1,000 millions.

What is clinically called influenza may be not one disease but a series caused by different microbes, and on the other hand the organisms hitherto described as *Bacillus Influenzæ* are not all identical with it, but belong to a group, the various members of which possess very different pathogenic powers. The presence of an organism conforming in every particular to *Pfeiffer's Bacillus* does not necessarily indicate that there has been an influenzal infection. Each strain of the bacillus may possess different pathogenic powers—in this way somewhat similar to the bacilli of the colon group.—L. ii./10,1289.

War Office Conference under Chairmanship of Sir W. B. Leishman to formulate recommendations as to Vaccine therapy in Influenza.

Pfeiffer's Bacillus plays a most important part in the production of the symptoms and complications of the disease but the existence of some as yet undiscovered virus may be regarded as possible. Pneumococci and Streptococci are chiefly responsible for the gravity of the secondary pulmonary complications. A vaccine was agreed upon containing—*first dose* B. Influenzæ 30 mill., Pneumococcus 100 mill., Streptococcus 40 mill, *second dose* double throughout. Interval 10 days, To be polyvalent and made from organisms isolated in the current epidemic, the vaccine to be sterilised at 55° C. for ½ hour and to contain 0·5% phenol.

Preferable to inoculate men before exposure to infection, but no harm in treating a body of men among whom influenza had already broken out but individuals not to be inoculated who already had fever or at the time suffering from catarrh. Further advice was :—

(a) *Children.* Not advisable to inoculate children under 3 *years of age*
From 3 to 7 years—¼ of the full doses.
From 7 to 10 years—½ of the full doses.
Above 16 years—full dose.

(b) *Colonial troops.*
First dose—½ the first doses.
Second dose—the full first dose.
Third dose—the full second dose.
(Interval 10 days).

For treatment of severe cases and complications :—

(a) The vaccine is most likely to be of use in subacute and chronic cases Here the initial dose should be 1/5 the first dose above.

(b) For severe cases of secondary broncho- pneumonia the vaccine is not advised but if it is desired to try it give 1/20 the first dose.—B.M.J. ii./18,470,494 ; L. ii./18,565.

The content of Influenza Bacillus in this vaccine, according to J. Matthews and Sir Thos. Horder, was thought far too little.

W. H. Wynn agrees and points out that 1000 million B. In fluenzæ may confer immunity lasting several months, while that fro 30 probably lasts but a few days. He employs 100 million eac pneumococci and staphylococci and 50 million B. influenzæ, an after seven days double the amounts—for prophylaxis. Fo *treatment* 50 million each pneumococci and streptococci and 3 million B. Influenzæ as soon after onset as possible. For broncho pneumonia the same dose, repeating or even increasing every othe day or sometimes daily. 1½ million as advised by the Conferenc cannot be adequate.—L. ii./18,642. See also Pr., Feb. 1919, an B.M.J. i./20,254.

The primary infection in the epidemic thought to be a strepto coccus but the 40 million suggested for preventive inoculatio thought to be too much.—H. T. Gillett, L. ii./18,643.

Epidemic Catarrhs and Influenza. Résumé on Etiology, Mortality Preventive Measures and Control. During the spring and through out the summer of 1918 there was almost constant replenishin of the infection by more virulent infection from U.S.A. and fro the continent. (During 1917 and 1918 there were reports of pre ponderant occurrence of hæmolytic streptococci in the lesions an secretions). The prophylactic use of vaccines to control epidemi catarrhs is doubtful—the prevention of pneumonia is by this mean more hopeful.—Sir A. Newsholme, L. ii./18,689.

Pfeiffer's bacillus is the agent which so markedly lowers the genera resistance of the bronchial passages and may thus be the real caus of the disease—there is a possibility however that the presence o an ultra-microscopic organism underlies all the phenomena.—R Muir and G. Haswell Wilson, B.M.J. i./19,3.

Stock vaccine should be potent. If the cultivation mediu does not contain a substance—*e.g.*, fresh human blood—to induce th microbes to produce their specific toxins they lose to a great exten their antigenic efficiency. Further, there is no need to kill by hea —use 0·5% Phenol Saline.—W. M. Crofton, B.M.J. i./19,240.

Influenza and Pneumonia; prophylactic inoculation by N.Z.E.F Mixed Catarrhal Vaccine. *Dose* 1. B. Influenza 500 millio Pneumococci and S. hæmolyticus each 250 million. *Dose* 2. Doubl in each case. Interval 7 to 10 days. No cases of either influenz or pneumonia.—F. L. Armitage, B.M.J. i./19,272.

Medical Research Committee Memorandum on Influenza. Wor in foreign countries.—L. ii./18,717.

Sputa showed a mixed flora: streptococci, pneumococci, M Catarrhalis and B. Influenzæ present in high proportion. Vaccin treatment similar to that laid down by the War Office Conferenc but *M. Catarrhalis added* (25 million for first dose and 50 for th second dose, also Meningococcus 10 million for first and 20 millio for second). For *curative* purposes the vaccine was used 1-1 strength. For daily dose or alternate days 1 Cc. containing strepto coccus 5, pneumococcus 5, Micrococcus Catarrhalis 5, Meningo coccus 2 and B. Influenzæ 2 million.—H. E. Whittingham an C. Sims, L. ii./18,863.

"Spanish Influenza." Pfeiffer's bacillus found exceptionally. Streptococci and pneumococci the most common agents of the complicating pneumonias.—Review of German work in the pandemic.—L. ii./18,177.

B.M.A. Discussion. Sir W. Herringham opened same with outline of the epidemic as met in France from its appearance as a mild and transitory fever in May, 1918, spreading with increasing virulence to the July epidemic when pulmonary symptoms first appeared, to be followed by a severe outbreak in September with a mortality of 5%, this—subsiding in January, was followed by a third wave beginning March, 1919, but of less severity and incidence. Nothing approaching a specific has been found though a variety of methods have been tried including vaccines and even the serum of convalescents. Question whether the epidemic is Influenza at all or at any rate whether it has not changed its character. Numerous communications were made. Surgeon Captain P. W. Bassett-Smith said there had been 80,000 cases in the navy in the year. Major Michael Foster found evidence of utility of preventive inoculation extremely slender. Major Tytler found Pfeiffer's B. in 93% of cases working at Boulogne.—B.M.J. i./19,488.

Influenza in India. Some of the earliest cases diagnosed in Bombay occurred on board a transport which reached that port May, 1918. The death rate began to rise in middle of September, and the second wave which reached its crest in October, '18, caused havoc to which the Black Death of 1348-9 alone affords parallel—not fewer than 4,899,000 persons (about 2% of the whole population) died of influenza or its complications in British India, the vast majority within 2 months. Making allowance for the native states not less than 6,000,000 persons perished in India. Indians have a low resistance to pneumonic infection.—Major Norman White, Sanitary Commissioner with the Government of India, B.M.J. i./19,417.

Acute Influenza and Influenzal Broncho-Pneumonia. For an adult man give 80 to 100 million pneumococci, streptococci, and B. Influenzæ; for an adult woman 60 to 80 million, for a child of 12 to 14, 40 to 50 million; for a child of 2 to 3 years, 10 to 20 million. If no response the next dose should be larger, the dose being repeated on alternate days or every day.—These doses are clearly much larger than those recommended by the War Office Conference.—W. H. Wynn, L. ii./18,874. See also this worker's success in prophylactic injection in the 1918 epidemic under Pneumonia.

Filtrable Virus as the cause of early stage of Influenza epidemic, confirming the findings of Nicoll and Lebailly. Experiments on monkeys.—H. Graeme Gibson and co-workers, B.M.J. ii./18,645.

In Australia to combat the pandemic the Federal Quarantine Department issued vaccines for prophylaxis and treatment without any apparent controlling influence but it was stated that severe symptoms were modified. Prof. Chapman deprecated their employment.—L. i./19,476.

Preventive Vaccines in U.S.A. employing Influenza 5 *billions*, Pneumococc-Types I. and II. each 3 billions, Type IV., 1 billion, S. Haemolyticus 100 millions.—L. i./19,707.

Aetiology of Influenza.—G. E. Beaumont, L. ii./19,234.

The *radius of infection* is very small—at three or four yards from the patient there is little risk.—Pres., Apl. '19.

Protection against influenza seems to be conferred by taking Quinine and Arsenic as in case of malaria patients.—Pres., Apl., 19, p. 78.

Epidemiology. Pfeiffer's bacillus played a part of vast importance; next came types of Streptococci. *S. hæmolyticus* often found in pulmonary lesions.—Ministry of Health Report, B.M.J. i./21,348.

Intimate association of Pfeiffer's bacillus with influenza. Its toxin is capable of re-producing experimentally the chief lesions found post mortem of the disease. Attempts to produce influenza experimentally in monkeys, rabbits and guinea-pigs with both filtered and unfiltered influenzal material were, practically speaking, negative. Strongly opposed to the idea of the organism responsible being a filter passer.—Prof. J. McIntosh, B.M.J. ii./22,137.

The Americans concluded that the etiology and portal of entry of the exciting cause of influenza (in U.S.A.) are both unknown. The organisms associated with influenzal pneumonia are the so-called mouth organisms present in the mouths and upper air passages of normal individuals as well as of influenza patients.—B.M.J. ii./21,1124.

Pneumonia and Influenza—Ministry of Health Report. Types of Pneumococci, distribution and serological characters of influenza bacilli, as

found in 1918-21. Influenza bacilli were recovered from the normal nas pharynx in over 30% of persons examined, in about 60% of cases of lob pneumonia, in 88% of cases of simple broncho-pneumonia and bronchit and, during the epidemic of January, 1922, in 65% of cases of influenza a influenzal pneumonia.—B.M.J. ii./22,388.

The influenza epidemic in the early part of 1923 had no predominati organism. Different cases varied widely in the flora, and apparently t majority were, in effect, suffering from the filter-passing virus, which w the basal infective agent, and less from the secondary infections, such pneumococci, streptococci, m. catarrhalis, etc.

"Local" prophylactic vaccines embodying the usual series of organis successful in restricting influenza epidemics in Rugby school.—A. I. Sim and J. W. H. Eyre, B.M.J. i./22,433.

Filter-passing viruses. The ultramicroscopic particles of bacteria wh stained red by Giemsa's stain do not contain chromatin, and hence cann be regarded as living organisms. H. M. Woodcock thinks a pathologic enzyme may be adsorbed on to the granules, so that though these granul are not the actual virus, they may indicate its presence. Some would st look on influenza as being caused by an ultramicroscopic virus.—B.M. ii./22,885.

Important work by Olitsky and Gates on the filter passing virus "***pneumosintes***" as the cause of influenza.—Jl. Experim. Med., Vol. 3 1921, Nos. 2, 3.

CANINE DISTEMPER. Causative organism not isolated, but probably d to a filtrable virus analogous to that of equine influenza, swine fever an fowl plague. The *B. bronchisepticus* (Ferry) and various strains of staph lococcus and streptococcus are found.—L. ii./21,1038.

Detoxicated Influenza Vaccine. (Thomson). Used with promisi results both prophylactically and as a cure.—D. Lees, L. i./19,1107. For general description of Detoxicated Vaccines see p. 941.

For further information on B. Influenzæ, vide Vol. II.

Malaria.

For the use of Quinine in treatment of malaria and in prophylaxis again relapses, *vide* Quinine Acid Hydrochloride, p. 713 *et seq.* and Quinine Sulphat p. 720 *et seq.* *See* also Quinine Periodide, Methylene Blue, Atoxyl, Arrhena Galyl and Salvarsan; *cf.* also Therapeutic Index.

Concerning the combating of malaria by drainage, sanitation, disinfectio etc., and a description of parasites see Vol. II.

Excellent résumé of advice for soldiers and others on prevention of malari —C. Christy, L. ii./17,485.

Histology of cases rapidly fatal in the Salonica force in 1916. Examina tions of brain, heart, muscle, adrenal glands, kidney, liver, etc.—L. Dudgeon and C. Clarke, L. ii./17,153.

Incidence of malaria among our troops in Macedonia, Mesopotamia an East Africa. The operations throughout hampered by high rates of sickne Lack of precautions based on existing knowledge—canalization, adequa use of tents, etc. A condemnation of the military side of the matter.— B.M.J. i./18,350.

Malaria, 12,000 cases in Macedonia treated by A. C. Alport (Review).—B.M. ii./19, 467. Thyroid gland enlargement in malaria.—J. B. Hume, B.M. ii./19,661.

Ozæna Vaccine.—*Initial dose* 50 to 100 millions increased t 250, 500, 1,000 and 2,000 millions if necessary with seven day interval

B. Ozænæ is found in cases of early atrophic rhinitis and auto genous Vaccines of it combined with other organisms present *e.g. Streptococcus, Pneumococcus, Staphylococcus Aureus* and *M. Catarr halis* have been given.—Abel, Page and others.

Pneumonia.

Sources of the Pneumococcus and Modes of Infection.—Pneu monia is rarely caused by auto-infection from the germ so commonl present in the throat in health, but is usually due to infection wit pneumococci present in the air, dust, etc.

It has been shown at the Rockefeller Institute that the throat organisms and those of the sputum from cases of lobar pneumonia are most frequently of different types. The pneumococci of these foci almost invariably correspond in type with the pneumococci of the sputum if and when the 'carrier' incurs a pneumonic attack.

Pneumococcal Vaccine (WIMPOLE INST.). **Ampoules** for Hypodermic use contain 25, 50, 100, 250, 500 and 1,000 million organisms in each.

This Vaccine, besides being of undoubted service in pneumonia when it should be given as early as possible in the attack is also employed in the treatment of empyema, especially in children (in adults, combination with a streptococcal vaccine may be advisable), in nasal and laryngeal catarrh, asthma and bronchitis, periostitis, otitis, endometritis, and pyosalpinx, where initial doses of 100 millions may be employed, when due to this organism.

Dose.—10 millions initially is repeated or increased at intervals of seven days, according to clinical symptoms. Cases of delayed resolution in pneumonia are benefited by injections of 50 to 100 millions every 8–10 days, while routine treatment of all cases of pneumonia during the first week by doses of 25–50 millions whenever there is a rise in the temperature has been much practised of late. In pneumococcal eye infections an initial dose of 250 millions is appropriate, and in pneumoccal septicæmia 10–25 millions.

It is probable that a large percentage of failures with stock vaccines is due to the vaccine not conforming in type with the infecting organism. Stock vaccines must be polyvalent and polyvalent in each of the types peculiar to the country. Autogenous vaccines are clearly preferable.

The percentage of cases of pneumonia due to bacteria other than pneumococcus is probably very much greater than is supposed. This was verified by the experience of the widespread epidemics in 1918–19 of so-called 'Spanish flu.' In cases **where pneumonia is said to supervene upon influenza,** the infection is a double one from the beginning, and much may be done to prevent the pneumonic attack by giving 25–50 million doses of Pneumococcal Vaccine, combined with 50–100 millions of *B. Influenzæ*, as early as possible during the influenzal attack.

Prophylactic Inoculation. It will be recalled that Sir A. E. Wright in his Witwatersrand Report, L. i./14,187 ; L. ii./12,1633, 1701, advised as the optimum prophylactic dose 1,000 million for the natives and that they should be re-inoculated after expiry of four months. He found, however, that doses up to 40,000 million produced nothing more than a slight constitutional disturbance and slight rise in temperature. Lister found the natives possess an extraordinary susceptibility to the pneumococcus and that they require high doses for immunisation. He advises a vaccine of four types containing 6,000 millions per Cc. of each type making a total of 24,000 million per Cc. Of this 1 Cc. is given as initial dose twice repeated at intervals of 7 days. Borel holds similar views and he

inoculated Senegalese troops in France with initial doses of 32,0 million without ill effect.

For white races work of investigators of the Rockefeller Institute sho that initial doses of 1,000 million each of the prevalent strains can be safe used and that with lower doses full immunity may not be secured. After days either 1,000 or 2,000 million is given and a further 2,000 million 7 or 14 da later.

Types of Pneumococci. Work at the Rockefeller Hospital divided 454 cas of lobar pneumonia into 4 types. Type I. was responsible for 33%, Type I for 29, Type III. for 13 and Type IV. for 20. (The strain found among th blacks on the Rand appears to be Type IV. F. S. Lister has in additio to these separated 4 additional types in S. Africa.) Type IV. (now calle Group X., see p. 905) predominates in the pneumococci found in the mouth of 50% or more of normal persons. For a digest of recent American wor see B.M.J. i./18,57.

F.S. Lister refers to about a dozen types of which A, B and C are responsib for 60% of cases in S. Africa. 'A' group is predominant in the Transvaa natives. It is not seen in America. 'B' and 'C'=the American II. and These latter are the most important in the etiology of lobar pneumonia. prophylactic vaccine of 'A,' 'B' and 'C' was encouraging. Types 'E,' 'H 'J' and 'K' might well be included.—B.M.J. i./18,351.

Double pneumonia after childbirth,—gradual convalescence and recover on use of Vaccine. Patient desperately ill until 48 hours after the injection when she rallied.—L. i./09,1454.

Pneumococcal cystitis and arthritis successfully treated by vaccine fror patient's organism.—L. i./09,1457.

Abscess of the appendix treated by pneumococcal vaccine.—B.M.J.i./09,105

Autogenous pneumococcic vaccines. Cases treated with success—initia dose being 50 millions. Often arrests the condition within 12 hours. Shoul be given as early as possible.—B.M.J. i./09,1530.

Sir A. E. Wright stated that he had been a sufferer from chronic bronchiti for 30 years, which cleared away entirely after a few doses of his own pneu mococci.—L. ii./09,472.

Acute infective endocarditis—Fraenkel's organism isolated from patient' blood removed from a vein. Initial dose 50 millions and further doses of 5 and 100 millions—this case is believed to be the first of its kind placed or record. A fairly large volume (10 Cc. at least) of blood should be taken fo culture.—Pr., Aug., '09,203.

Pneumonia—cases well treated with Vaccine.—L. i./12,575,646

Acute pneumococcal tonsillitis treated by stock Vaccine and autogenous with success. Temperature and swelling in the throat reduced.—S. P Shivdas, L. ii./12,1149.

No person is more liable to become the victim of acute pneumonia than the chronic alcoholic, nor is any person so difficult to treat during the illness or so likely to succumb. Often hearty-looking and ruddy-faced, he makes the p orest stand against the profound toxæmia produced by the pneumococcus

Prophylactic injections in the 1918 epidemic given to 230 persons, 100 million pneumococci and streptococci and 50 million B. Influenzæ being the first dose and after a week double these doses to 90 of them. The remaining 140 had equal numbers of each organism. In some a third dose of 400 million and in a few 800 million was given. At an Institution 112 of the staff were inoculated twice leaving a balance of 53 not treated. Of the 112 two only had mild attacks; of the 53, 25 had mild attacks in June and escaped in the latter epidemic; one had a mild attack in February and subsequently severe broncho-pneumonia, 14 of the remainder escaped in the earlier part of the epidemic but contracted influenza later, two with severe broncho-pneumonia and one dying. These small doses give clearly some measure of protection —W. H. Wynn, L. i./18,874. See also this worker's recommendations in treatment of acute influenza and influenzal broncho-pneumonia under Influenza.

Vaccines in pneumonia—striking effects. No advantage in using 1,000 mills of detoxicated vaccine if 100 mills. of ordinary vaccine will produce the same or better results.—W. H. Wynn, L. ii./22,495.

Good results from doses of 100 million for an adult and 50 million for a child. —A. Erian, Pr., Dec. 23, 430.

Anti-pneumococcic Serum.—*Dose*, 20 to 50 Cc. into the lumbar or gluteal region as early as possible, repeated the following day, or until temperature falls.

Type I. Pneumococcic Serum.

As the types of pneumococci (see p. 904) have in general a high degree of specificity a homologous serum is necessary The immune serum against Type I. is of great therapeutic value but those corresponding to Type II. and others have not yet proved effective —they only contain a very low content of antibodies. The use of serum should therefore be confined to cases proved to be of Type I. For details of manufacture of this serum see Cole & Moore, Jl. Exp. Med., Baltimore, 1917, XXVI., 537–561, also other references per B.M.J. i./18,58. A dose of 90 to 100 Cc. of the serum repeated eight-hourly unless contraindicated till at least 250 Cc. have been given is advised by these American workers. They advise also a preliminary intradermal test to remove all risk of grave consequence from anaphylaxis. If there is any indication of its existence the use of very small doses (initial 0·025 Cc.) intravenously slowly injected is recommended every half-hour, doubling the dose each time until 25 Cc. have been given. Results with Type I. serum were satisfactory. 63 American soldiers were treated with mortality of 8%. Among the uninoculated the mortality was 39%.

Ministry of Health Report No. 13 (1922) confirms that it has not yet been found possible to prepare a serum for cases of pneumonia not due to Type I. Knowledge is needed as to the nature of reactions between a micro-organism and its animal host. The pneumococcus and Pfeiffer's bacillus are both common inhabitants of the upper respiratory tract, non-pathogenic and harmless saprophytes in apparently healthy people. They are both intimately associated with 'colds' but the pathogenic role of the pneumococcus is accepted while the pathogenicity of Pfeiffer's bacillus is uncertain. Pfeiffer's bacillus is, however, known to be toxic and its presence in the tissues cannot be regarded as innocuous. It will probably take some years to prove whether Pfeiffer's bacillus is, or is not, the cause of influenza.

CONFERENCE ON STANDARDISATION. Decisions. The Conference accepted the American Types I., II. and III., as standards for international purposes. The term 'Group X' to replace 'Type IV.' (a collection of heterogeneous strains). The action of the serum to be investigated in properly equipped institutions.—L. ii./22,1293.

Bacteriological and clinical observations on pneumonia and empyemata with specific reference to the pneumococcus and to serum treatment. Med. Res. Council, Special Report Series 79—Type I. Serum investigated clinically gave encouraging results in 6 cases.—B.M.J. ii./23,618.

Pane and Renzi's Antipneumococcic Serum.

Supplied in two strengths, Nos. 1 and 2.

Dose.—15 Cc. of No. 1 repeated, if necessary, in 24 hours, is of value, especially in severe cases with high temperature and rapid pulse. Improves tone of pulse where there is great heart weakness. The toxin secreted by the coccus appears to act on the muscles of the heart and weakens it.

Site of Injection.—Subcutaneous tissue of the abdomen.

If patient very weak the Serum may be given per rectum—the bowel being previously washed out by an enema of warm salt solution.

Diagnosis.—In suspected cases examine the fauces for pneumococci. The use of antiseptic gargles may check further infection.—Pres., July, '08,131.

Pneumococcal Meningitis treated by Pane's Antipneumococcic Serum *per os*. 5 Cc. doses *mane*, no food being given for two hours before or two hours after. Dose *per os* double that necessary hypodermically. Lumbar puncture simplified by Eucaine and Adrenalin hypodermically.—W. Broadbent, B.M.J. ii./16,586.

Pneumonia treated with serum intravenously and Adrenalin. 70% cleared up rapidly.—Renaud, B.M.J.E. ii./21,9.

Bacillus Pyocyaneus Vaccine.

Dose. 5—1000 millions.

Pyæmia due to *B. pyocyaneus* successfully treated by a vaccine from patient's organism. Initial dose 40 millions followed by 60 millions at 8 days with 100 millions 10 days later, and 100 millions two succeeding fortnights —a striking example of potency of vaccine therapy. Gravity of *B. pyocyaneus* infection apt to be disregarded.—B.M.J. i./09,1169.

Pyorrhœa Alveolaris.—It is probable that in very early cases of pyorrhœa alveolaris the bacteriology of the condition may be a relatively simple one, *Streptococci, Pneumococci, Staphylococci* and *M. Catarrhalis* alone or in combination being probably causes —later on, however, secondary infection by spirochetes, streptothrices and vibrios inevitably occurs and these may entirely replace the original invaders. Observations have shown that **Vincent's Fusiform Bacillus** alone may be responsible for most intractable ulcers, while cultures of the above organisms in liquid media are intensely toxic; the view, therefore, that they may be responsible not only for the local but also for the general toxic symptoms in advanced cases of pyrorhœa is more than justified.

Pyorrhœa Vaccine containing the *Streptococci* and *M. Catarrhalis*, and the *Spirochætes* and *Streptothrices* in small doses is used. A Vaccine of this kind is supplied in doses of 25, 50, 100, 250 and 500 million.

Emetine has been employed in treatment. *See* p. 519.

A description of the bacteriology of a large variety of organisms found in pyorrhoea alveolaris. Opsonic Index estimations were made. It was found that a low index was shown to certain bacteria taken from the mouth in cases having some form of constitutional disturbance, *e.g.*, toxæmia, anæmia, various forms of gastric and intestinal indigestion. Injections of Vaccine —Sir Kenneth Goadby.—L. i./07,633; 819; ii./07,1818.

An Emulsion of Sublimed Sulphur in Glycerin used to cleanse the mouth and gums in cases treated by Serum and Vaccines. It had marked effect on the local inflammation and pain.—Sir Kenneth Goadby, B.M.J. ii./08,477.

Streptococcus Salivarius normally in the mouth is harmless, but may be pathogenic, as in pyorrhœa alveolaris.—B.M.J. i./11,693.

Entamœba buccalis has been stated to be responsible for pyorrhœa (Barrett of America and Chiavaro of Italy). Amœbæ in the mouth have been observed by many since 1849. Entamœba Buccalis is 6 to 30 micromillimetres in diameter, lively in motility, poor in chromatin, with a thick membrane. It has been found by Barrett in nearly every pyorrhoea pocket examined.—J. S. White, P.J. i./15,797.

Parodontal Streptococcus Vaccine is also for use in pyorrhœa alveolaris, dental abscess, in treatment of small blisters and ulcers of the mucous membrane of tongue, cheek and lips, also in pyorrhœic rheumatism. *Medium Dose.*—6 to 10 millions.

Relapsing Fever.—See *Vol. II.*, also Salvarsan chapter.

Rheumatism.

Pathogenesis and Treatment of Rheumatic Fever (and Chorea).

Rheumatic Fever—an acute specific disease. *Diplococcus Rheumaticus*,—an organism found by Poynton and Paine growing in short chains, Gram +, forms Lactic, Formic, and Acetic Acid and curdles milk—is the cause of the disease. The organism has

a strong vitality on Blood Agar. It may be shown in all rheumatic lesions, though with difficulty. There is a close relation between chorea and rheumatism—the same organism may be responsible for both. Results with a Vaccine in two cases on the endocarditis. Rapid subsidence of fever in all cases. Similar results in acute rheumatism with pericarditis, chorea and endocarditis.—R. M. J. Buchanan, 1912.

It is now believed that the *S. Rheumaticus* is a variety of *S. fæcalis* and other streptococci have been found in cases of rheumatism but *S. Rheumaticus* is the most common variety.

The organism produces ½ Gm. of Formic Acid (also Acetic Acid) from a litre of culture. The urine of rheumatic patients contains up to 0·2 Gm. in a day's urine. Salicylates administered decrease the amount. This acid is not known to be produced in like amount by streptococci from other sources. —B.M.J. i./07,1233. See also Pr., Feb., '09,250.

Streptococcus Rheumaticus Vaccine (Wimpole Institute) for complications of rheumatic fever. *Initial dose* 5 to 10 millions.

In doubtful cases of rheumatic arthritis a dose of 250 to 500 millions of *Streptococcus Rheumaticus* may be given diagnostically, and the temperature observed every four hours for 24 hours; a marked temperature or local reaction will assist greatly in establishing the diagnosis. **Ampoules** containing doses of 5, 10, 25, 50, 100, and 250 millions are prepared.

Rheumatoid arthritis treated satisfactorily with doses of 5 millions subcutaneously every two or three days.—B.M.J. i./11,192.

The association of disease of the mouth with rheumatoid arthritis and certain other forms of rheumatism. In diseases of the jaws, especially rarefying alveolar osteitis a strepto-bacillus was isolated. Pure Cultures inoculated into or around the knee joints of rabbits produced symptoms like arthritis deformans. Treatment of cases by autogenous Vaccines made from the organism effected amelioration and disappearance of the symptoms in a number of cases. Initial dose was 10 millions, subsequently 150 and 200 millions. First given at periods of ten days, then at fortnightly intervals for six months, and afterwards at intervals of six weeks for a year. There was generally increase of arthritic pain and swelling by the first injection. It is better to reduce the initial dose to avoid this exacerbation.—Sir Kenneth Goadby, L. i./11,639.

Neutral Red Egg Medium (Fleming's) is used for cultivating the organism from the urine. Extreme caution in the use of this Vaccine is necessary. Even 500,000 may cause a most unpleasant reaction and until the urine is free from organisms more than 5 million can seldom be given.

Distinguish from Staphylococcic Vaccines. The organism disappeared from the urine as improvement with Vaccine was effected.—H. Warren Crowe.—L. i./13,1377; A. Bertram Soltau, *ibid*, 1379.

Subacute rheumatoid arthritis well treated.—B.M.J. ii./10,1918.

In the treatment of blennorrhagic arthritis when all other treatment has failed, 3 to 5 Cc. of the synovial fluid is withdrawn and reinjected under the skin of the articulation. This process may be repeated every two or three days. The same procedure gives equally encouraging results in hydroarthroses of all kinds.—L. ii./11,1437.

Rheumatism in childhood.—If Vaccines have the wonderful powers that some would lead us to believe and can influence the mysterious processes of disease with such certainty, and almost with such monotonous regularity, then they must also possess a decided power for harm if wrongly used. Initial

doses should be small. Commence with one million and doubling each dose test each advance *by the occurrence of any reaction*, which demands *immediate* caution. Good result has undoubtedly followed in some cases, but equally disappointing ones with others.—F. J. Poynton, Pr., Feb., 1913,416.

Chronic arthritis. Streptococcal Infection is frequently concerned in chronic arthritis. 20 cases treated by Vaccines of Streptococci derived from various sources—either from the mouth in cases of oral sepsis (gums), from the urine or from the fæces (*S. fæcalis*). Six of the cases much improved six showed some improvement, six unchanged.—D. W. Carmalt Jones, B.M.J i./13,1047.

Experimental rheumatism. Rabbits, inoculated with Streptococci recovered from cases of rheumatic infection have developed arthritis, carditis and other lesions. The lesions of human clinical rheumatic infection were reproduced in essential details in the rabbits by inoculation from patients suffering from rheumatic infection.—Differences in the histology of experimental and human rheumatism.—L.ii./12,1209,1394,1461,1539,1610,1678 1791.

Using cultures of *M. rheumaticus* (of Poynton and Parnet Beattie) Ralph Stockman was unable to produce in animals symptoms of lesions of rheumatic fever. Certain Vaccines likewise of the killed organisms failed him in patients suffering from rheumatism.—B.M.J. i./13,597. We provide further abstracts of this paper under Salicylates, p. 83.

Rheumatoid arthritis is due to *Staphylococcus epidermidis albus* (var. *de formans*). Vaccine given with encouraging results. The initial dose in the majority of cases was 500,000. The interval with small doses was 3 days with large doses a week.—H. Warren Crowe, B.M.J. ii./20,815.

B. Coli Vaccine intravenously in rheumatoid arthritis, see B. Coli.

Septicæmia, Anti-Streptococcic Serum.

Dose.—30 Cc. early in any form of septicæmia, and repeated the same day and daily afterwards. Injections should be made at the seat of inflammation, &c., if any, as in erysipelas, so as to produce good local effect. Usually supplied in 10 Cc. phials.

Special Anti-streptococcic Sera for use in **Erysipelas, Puerperal Fever, Scarlatina, Endocarditis and Rheumatic Fever,** are obtainable. It is an anti-bacterial serum, and should be recently prepared.

In manufacture the virulence of the *Streptococcus* is increased by passage through a succession of animals. Finally a dose of 100 to 200 Cc. is reached. The horse is bled and the serum standardised.

Uses and References.

Puerperal fever and the varied forms of septicæmic infection following childbirth have been treated in many instances with it with good results.

It has been advised that a few doses of 10 Cc. should be given as **prophylatic** before operations on the mouth and throat.

Indicated in simple septicæmia or sapræmia. Erysipelas, endocarditis carbuncle and acute rheumatism have been treated with it.

Streptococcic infection (or mixed Strepto. and Staphylo.) in sore throat, best treated by 5—10 Cc. combined with swabbing with a solution containing 10 grains of a powder composed of equal parts of Sodium Bicarbonate, Sodium Chloride and Potassium Chlorate in an ounce of water. This solution will dissolve the membrane in question.—B.M.J. ii./09,196.

Streptococcic Vaccine may be employed in localised infections, as erysipelas, lymphangitis, ulcers, sinuses, tonsillitis, adenitis and mastitis; also in asthma and bronchitis, and in generalised infections such as septicæmia and pyæmia, provided always that for these pathological conditions the Streptococcus has been proved to be responsible. *Initial dose* in very acute and in generalised infections should be 5 or at the most 25 millions; in more chronic conditions a dose of 25 to 50 millions is suitable. **Ampoules** for Hypodermic

use are supplied containing 5, 10, 25, 50, 100, 250 and 500 millions respectively.

A detoxicated variety of this Vaccine is also supplied in doses of 100 to 2,000 millions.

Streptococcus Conglomeratus Vaccine is prepared for the complications of **scarlet fever.** *Initial dose* 5 millions.

In view of the fact that Anti-streptococcic Serum has been a failure in a large number of cases of erysipelas, pyæmia, etc., and recognising that the streptococcus is a very large genus—it may be desirable to prepare an autogenous vaccine.

Erysipelas.—Diagnosis can be based on the 'spread of the erythema from a local focus,—true inflammation of the epidermis with exudation of leucocytes, —not merely a transitory erythema due to vascular dilatation, as occurs in cellulitis and lymphangitis.' It is caused by one of the organisms of the Streptococcus class.—*Streptococcus pyogenes* being most frequent.—L. ii./09, 1070.

Foul breath. Case of bacterial infection of the stomach well cured b a Vaccine prepared from patient's organisms, a combination of Streptococcus from the urine and B. Coli from the stomach—four injections were given at intervals of one week, the range of doses being Strepto and Coli of each 5 increasing to 20 of each. B. Coli is usually found in the stomach in obstruction of the pylorus due to malignant disease. No previous case recorded by an infection of the stomach by this organism with normal gastric motility —M.P.C. ii./11,528; B.M.J. ii./11,1593.

Malignant endocarditis, a case of, treated with an autogenous Vaccine (Streptococci isolated from the blood) showing disappearance of the infecting organisms from the blood within twelve months, together with marked improvement in clinical symptoms. The Vaccines were given in 10 Cc. of Normal Saline by the mouth in an empty stomach.—A. Latham and E. L Hunt, P.R.S.M., Clin. Sectn.

Combined treatment with Autogenous Vaccine and *Autogenous Serum* may eventually become the standard treatment in infective endocarditis (Streptococcal). An extremely grave case is described in which Autogenous Streptococcal Vaccine was pushed up to 15 millions and a special Serum employed by injection and *per os* (25 Cc. doses). The combined effect may have been similar to that in Sensitised Vaccines. The Streptococcus obtained from the blood was S. Salivarius, almost proving its origin from a tooth abscess from which the patient suffered.—Henry Hemsted, L. i./13,13.

Autogenous Vaccine in cellulitis. An incision is made under local anæsthesia into the primary focus, an agar slope is inoculated and a Vaccine prepared. The Vaccine is usually a mixed one consisting of *Streptococci* and *Staphylococci*. A first dose of 200 millions increased in some cases to 1,000 millions. The trouble necessary is justified by results.—B. Hughes, Pr., July, 1912.

Puerperal infection.—Good results with Autogenous Strepto. Puerperalis Vaccine. Other cases of mixed infection, *e.g.*, Streptococcus and Diphtheroid Bacillus, Streptococcus and B. Coli, etc. Suggestion to immunise a woman before confinement by an injection of a Strepto. PuerperalisVaccine.—J. F. Jordan, B.M.J. ii./12,1.

The mortality amongst notified cases of puerperal fever it is stated is about 60%. This may be reduced to about 30% by treatment with Autogenous Vaccines.—Pr., July, '13,113.

Septic sores and Nile boils well treated with Streptococcic Vaccine in the former and Staphylococcic in the latter.—H. Warren Crowe, L. ii./18,667.

Scarlet Fever. Prophylactic inoculation. The subcutaneous injection of 0·0001 Cc. of the blood of a scarlet fever patient into children produces no reaction but confers a degree of active immunity sufficient to prevent occurrence of the disease on introduction of the virus contained in 0·15 Cc. of blood.—I. Takahashi, L. ii./21,645.

Hæmolytic Streptococci often present in throat swabbings especially where tonsils are enlarged, also in cultures of the pharynx but not in gum margin or in nose. Largely prevalent in scarlet fever, measles, influenza and lobar pneumonia. In respiratory complications the actual cause of the disease may so act on the respiratory mucous membrane as to render it susceptible

to attack by these streptococci. Is it possible to render individuals immune to the action of these organisms, often starting with a sore throat ? Mouth antiseptics recommended. Classification of types of organisms based on hæmolytic and immunological reactions.—J. M. Beattie, B.M.J. ii./21,786. See also J. H. Dible, *ibid.* 789.

Infection of the teeth and gums : a useful classification of the various complications arising. Intestinal infections frequently result from dental infection. *Plombières colon irrigations* or autogenous vaccines made from the streptococci found in the teeth and intestine may be of value.—Sir William Willcox, B.M.J. i./23,53.

Autogenous Streptococcus Vaccine found efficient in puerperal fever.—B.M.J. ii./22,644.

Operations on the lower part of the alimentary tract liable to suffer infection. Ten days before give a vaccine of streptococci and B. Coli, repeated three days before the operation, and on the night before, 8 Cc. of 2% Nucleinic Acid.—P. P. D. Wilkie, B.M.J. ii./23,189.

Erythema nodosum treated by antistreptococcic serum.—A. H. Carter, B.M.J. ii./23,414.

Staphylococcal Vaccine (*S. albus* and *S. aureus*, also *Mixed* Vaccine—*S. Albus* and *S. Aureus* in equal proportion.

Dose.—Initial 100 millions, increased to 1,000 or even 5,000 millions.

In cases of acne, *Staphylococcus albus* is commonly associated with the Acne Bacillus (*q.v.*). In boils, carbuncles, sycosis, ulcers, and sinuses generally, and in acute generalised infections, such as pyæmia, ulcerative endocarditis, septicæmia, and peritonitis, either *S. Albus* or *S. aureus* may be found, but the *S. aureus* is relatively the more common. The mixed vaccine may if necessary be used.

A carbuncle is less easy to cure than boils, because the blood cannot be brought into effective contact with the germs. Administer Citric Acid internally to diminish its coaguability and apply locally a solution of Salt and Sodium Citrate to decalcify the lymph.—Sir A. E. Wright.

Acne of the type with much oily seborrhœa and comedones abundant inoculation treatment with Staphylococcal Vaccine alone not of much value. According to Whitfield the comedo is not Staphylococcic in origin, but due to the growth of a micro-bacillus in the neck of the pilo-sebaceous follicle.

Boils, in nine cases out of ten, 100 million Staphylococci will cure.—Sir A. E. Wright.

Eczema, acute, when the suppuration is not controllable by ordinary means and the stage of " chronic " pus infection is reached has been well treated by vaccines.

In acute mastitis Vaccine of the two main infecting organisms, viz., *Streptococcus* of one variety or another, and *Staphylococcus Aureus* was of value. The latter is the more common organism.—B.M.J. i./11,865.

Ulcerative endocarditis in a baby with pyæmic abscesses cured by drainage and Vaccine (Staphylococcus Albus). 2½ million being injected once a week for two months, then gradually decreasing the dose to ½ million. The improvement in the infecting knee joint was excellent,—prognosis looked extremely bad.—B.M.J. ii./10,1772.

Furunculosis. If no improvement after three or four injections make an autogenous vaccine.—Athole Ross, Pr., July, '13,100.

Tetanus.

Amyl Nitrite inhalation is valuable for checking the dangerous spasms of the glottis and respiratory muscles.

Oxidising Antiseptics, for example Hydrogen Peroxide, Potassium Permanganate, Chlorine water and Iodine Solution are particularly unfavourable to the anaerobic growth of the organisms. Then have the power of rendering toxin non-toxic, but *there is no evidence tha*

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Phenol (Bacelli's method) *or Magnesium Sulphate injections* (*vide* p. 541), *have any effect on the course of the disease.*—W. O. Memorandum on Tetanus, B.M.J. ii./16,647,660.

Oxygen Injections delayed death of guinea-pigs inoculated with fresh bouillon and agar cultures of B. Tetani. Suggested for treatment.—H. O. Howitt, and D. H. Jones, L. i./15,752.

Bromide and Choral may be needed; large doses of fluid are advised.

Tetanus Antitoxin. The **Lister Institute** advises as follows:—

(1) ***In an actual case of Tetanus.*** At first sign of tetanus give very large doses energetically and continuously—3,000 to 8,000 U.S.A. units beneath the spinal arachnoid (in the usual position for lumbar puncture) and 9,000 to 16,000 units intravenously. Before the intravenous injection, however, inquire whether patient has any idiosyncracy, such as liability to attacks of asthma, to be effected by emanation from horses, or if he has previously been treated with horse serum, etc. Then give a further 10,000 units partly *intramuscularly* and *partly subcutaneously.* If the patient is worse at the end of 18 hours repeat the intraspinal dose daily for three or four days—also the intravenous and intramuscular doses if required. It is better to give too much than too little. On improvement give 1,500 to 4,000 units subcutaneously twice daily for several days. Diminish the treatment gradually *until fear of relapse is gone.*

Warm the serum first to 99 *or* 100° *F. before injecting.*

After the first intraspinal injection there may be increase in symptoms. Rise in temperature with rashes which should pass off.

Wherever possible give intraspinally in addition to intravenously and intramuscularly. Experience shows, however, that Prophylactic use is best.

(2) ***Premonitory Symptoms.***

General restlessness suddenly changing to a desire for rest occurring a day or two after infection. Unreasonable outbursts of temper. Increased nervousness. Sleeplessness with distressing dreams and may be nightly delirium. Temporary giddiness, violent headache, excessive yawning, diffuse backache. Trembling of the tongue which is put out to one side, also unilateral palate trouble. Some local swelling, without redness, of the injured member and throbbing of its arteries notwithstanding that the limb is raised. Slight jerking may follow pressure on the flexor tendons and the muscles may be noticed to be in a condition of increased irritability. A peculiar smelling sweat and darting pain in various parts often occurs. Difficulty in micturition, due to spasm of the sphincter vesicæ, which may last from a few minutes to half an hour. Changes in the facial appearance, the patient *looks* anxious, though there is as yet no *risus sardonicus.* The following symptoms may occur later:—Increased flow of saliva, nystagmus, strabismus, ear-ache. Spasmodic cough. Stiffness at angle of jaw. Difficulty in swallowing. Tremors and clonic spasms which are not painful and may not attract attention. Pain persisting after muscular contraction induced by effort.

(3) ***Prophylactic Use of Antitoxin and Treatment of Wound.***

Dose.—At least 500 U.S.A. units to be given *under the skin of abdomen or flank* in every case of injury where possibility of B. Tetani infection. If there is much soiling of the wound or if 48 hours have elapsed 1000 to 1500 units. A further dose of 500 units in a week. Use Iodine in the local treatment of the wound as it has strong destructive action on Tetanus Toxin. If there is much dead tissue in a wound which is several days old or if much soiled with

dirt give 1,000 to 1,500 units *intramuscularly* if possible 3 to 4 hours before cleaning or scraping the wound. Intramuscular injections are preferably given in the outer side of the thigh (into the body of the vastus externus muscle).

U.S IX. has in addition to **Serum Antitetanicum** a **Serum Antitetanicum Purificatum.** This latter is a solution in normal saline of the antitoxin-bearing globulins separated from other constituents of the serum. Both of these have potency not less than 100 units per Cc.

DRIED ANTITETANIC SERUM U.S. is made by evaporating either in vacuo over a desiccating agent or by passing over it a current of warm air freed from bacteria. Potency not less than 1,000 units per Gm.

Dose.—(Hypodermic) of any of these three 10,000 units. Protective 1,500 units.

Experience gained in the first year of war confirmed the opinion that 500 to 1,000 U.S.A. units is sufficient prophylactic dose for the majority of cases. In severe wounds repeat once or twice at intervals of a week.—A. T. MacConkey.

P. JAP. IV. has LIQUID SERUM, with not less than 5 Behring units in 1 Cc. also DRIED SERUM of potency at least 50 Behring units in 1 Gm.

For treatment at least 3 000 units intrathecally (intraspinally). At the same time 10,000 units to 20,000 units intravenously and subcutaneously. To be repeated as frequently as the course of the disease seems to demand.—Sir D. Bruce, B.M.J. ii./15,593. *See* also below.

W.O. Committee Memorandum. Primary dose of antitoxin in prophylactic and preventive treatment of wounded at dressing station or field ambulance should be 500 U.S.A. units. Second and following doses of 500 units to be given at home hospitals. *The best results are obtained by intrathecal (intraspinal) injection* at the earliest stage repeated for three or five days and supplemented by intramuscular doses. When operating at the site of wounds give as prophylactic 500 units or more intramuscularly two days before the operation. Intravenous injections should not be made owing to risks of anaphylaxis.—Detailed method of giving intrathecal injection.—B.M.J. ii./16,647,660.

102,000 units of Antitoxin in all injected in a case. The intravenous and intrathecal doses under chloroform. Recovery. R. Lester Scott, L. ii./15,974.

Effectual daily dose is about 10,000 to 12,000 units—the bulk of it to be given intravenously. There is grave danger in interfering with the infected surface of a wound when tetanus has declared itself. This does not apply to amputation above the site of injury.—R. G. Abercrombie, B.M.J. i./16,339.

The duration of the complete passive immunity conferred by a dose of Antitoxin is short—enormous doses would have to be given to obtain immunity for a *length* of time. 250 U.S.A. units would protect a man—weight for weight as compared with a guinea-pig—for a week. 500 units would allow for the man being twice as susceptible.—A. T. MacConkey and A. Homer, L. i./17,259.

Anaphylactic Shock.—The danger of this is negligible when the prophylactic dose is contained in such a small quantity as 2 to 3 Cc. of horse serum. In curative treatment where massive doses have to be given the case is different. Small subcutaneous doses rapidly increased remove risks.—L. i./17,105,114.

Prophylactic injection prolongs the incubation period enormously on infection. Tetanus may therefore occur after wounds have healed. Five mild cases treated intramuscularly and subcutaneously, all recovered. Six cases intrathecally. Fourteen intravenously—some of these by a single dose of 30,000 U.S.A. units. 13 recovered.—H. R. Dean, L. i./17,673.

Intrathecal injections manifestly superior to intramuscular. Animal experiments.—Sir D. Bruce, L. i./17,680,986, see also F. W. Andrews and T. J. Horder, *ibid.* 682, F. Golla, *ibid.* 686 ; M. Greenwood, *ibid.* 687 ; J. Gow, *ibid.* 689.

Modern view of Tetanus. The toxin is transported to the central nervous

system along the motor nerves. Therapeutic use of Antitoxin is fully justified and indeed imperative. It is impossible to say in a case whether the toxic dose already in the nervous system is or is not a fatal one. The prompt use of Antitoxin may neutralise just the last amount of toxin in the blood which if it had got into the nervous system would turn the balance against the patient.—F. Ransom, L. ii./17,928.

The toxin passes mainly along the perineural lymphatic clefts.—Teale and Embleton, Jl. Path. and Bact., Vol. 23, '19.

C. S. Sherrington "Antitetanus Serum in the Monkey," *ibid.* 964. F. Golla.—Recent Statistics *ibid.* 966. R. N. Salaman—Ten Cases *ibid.* 971.

Analysis of cases of Tetanus in the Army between Nov. 1st, 1916 and Dec. 31st, 1917.—S. L. Cummins and H. Graeme Gibson, L. i./19,325.—*See also* Sir D. Bruce, *ibid.* 331.

Preparation.

The method of preparing Tetanus antitoxin consists in rendering animals immune to the tetanic poison by repeated inoculations and increasing quantities of the tetanus toxin, after first protecting them with a large dose of tetanus antitoxin. The animals are then bled and the serum prepared and preserved.

Units of Immunity.—The U.S.A. unit established by a Decree of Congress is commonly employed. It consists of ten times that amount of Antitoxin which when mixed with the Standard Test dose of toxin and injected beneath the skin of a guinea pig weighing 340 to 370 Gm. saves the life of the animal for more than 96 hours. For further information see McConkey.—B.M.J. ii./14,609, and ii./15,849.

For **Veterinary use** the Lister Institute supply special instructions.

The horse injected with Tetanus Antitoxin is not rendered *permanently* immune. *Protection* is a matter of weeks or months at the outside.

Dry pulverised Anti-tetanus Serum as a Wound Dressing.—This is dusted on wounds which may have become infected with dust, mud, &c. Infection may thus be prevented; in addition apply antiseptic dressing. Tetanus may also result in new-born children owing to infection at the umbilicus after birth—sometimes from the use of Fullers Earth.—W. W. W. See also p. 155.

Intra-Cerebral Injection of Anti-Tetanic Serum has been practised.

The injection must be concentrated and free from antiseptic. A blunt needle is used.

Subdural injections of large doses encouraging. 1,500 units given through a drill in the cranium in addition to intraspinal and intramuscular injections. One patient received 36,000 units intravenously and intramuscularly in a week.—B.M.J. i./16,620.

It has been determined that tetanus spores free from toxin and extraneous micro-organisms do not produce tetanus, but the spores germinate and the bacilli remain quiescent in the tissues for long periods, and when an **Injection of Quinine** or **Calcium Chloride** or **Lactic Acid** is given, necrosis of the tissues surrounding the site of injection occurs and should any of these dormant bacteria gain access to this locality they may light into activity and produce tetanus.—F. H. Teale.

Antitetanus Toxin will prevent tetanus in animals if given before tetanus inoculation, but it has no effect after. During the war the subjects of tetanus were, so to speak, *flooded* with tetanus antitoxin—those cases only recovering which were not acute or chronic. F. H. Teale's work demonstrated the reason, namely that the antitoxin does not gain access to the spinal cord through the circulation.

DIFFERENCE IN RATIO OF UNITS. Experimental work needed to investigate further. International Conference at Paris.—L. ii./22,1294.

Delayed tetanus treated with large doses of serum—a total of 236,500 units given intrathecally after lumbar puncture. Acts quicker than intramuscular or subcutaneous.—S. E. Denyer. L. i./21,1356.

Passive immunity against tetanus. Work to determine how far the antiserum protects against infection with *B. tetani* as distinct from tetanus-toxin. To cause infection with multiplication of tetanus bacilli and development of the spores, the local defence of the tissues must be broken down by

some such agents as ionizable Calcium Salts or Colloidal Silica.—Gye and Kettle, B.M.J. i./22,74.

Growth of tetanus bacilli takes place between PH5 and 8·5 the optimum being 7 to 7·6. For tetanus toxin the stability zone is between PH5·8 and 8, the optimum being 6·0 to 7·5.—J.C.S.A. i./1922,303.

Anaphylaxis to 500 U.S.A. units of serum.—R. S. Woods, B.M.J. ii./21,11

Anaphylaxis, delayed. Two cases, one due to Antidiphtheria Serum following Antitetanic Serum, and the other due to two doses of Antitetanic Serum, the interval being six years.—J. Gillman Moorhead, M.P.C., Nov. 8/22,387.

Case of tetanus reported without evident source of infection.—J. W. Goler and C. M. Reitz, M.P.C., Jan. 24, 23,73.

Trypanosomiasis. *Vide Vol. II.*

Tuberculosis.

For the continuous antiseptic inhalation treatment of pulmonary tuberculosis see pp. 394, 395.

The results of the first year's working of the compulsory notification of infective diseases, including tuberculosis (*vide infra*) showed that tuberculosis headed the list with 110,551 cases—which amount to 3·06 per 1,000. Scarlet fever came next with 2·98 per 1,000.—Na., Apl., 24,1913.

Tuberculous Milk as source of Infection. Vide Vol. II. under B. tuberculosis. See also Nutrimenta, Boiled v. Unboiled Milk. Vol. I. p. 583.

Tuberculosis Notification Order.—The order was designed to complete the organisation for ensuring notification to health authorities of all cases of the disease. A medical practitioner is not required to notify any case which has already to his knowledge been notified either under this Order, under the Poor Law Order (1908), or under the Hospitals Order, if the notification has been made to the M.O.H. of the Area within which the patient resides ; but if a patient who has been notified in the area of one Sanitary Authority removes into another a fresh notification to the M.O.H. of the new area should be given. Patients in a prison, reformatory, school or lunatic asylum and patients in a Poor Law Institution, or under the care of a Poor Law District M.O., are not to be notified under this Order, nor are applicants for life insurance, nor a passenger or member of the crew of an emigrant ship, nor an inmate of any building, ship, vessel, boat, cart, van, shed, or similar structure belonging to His Majesty the King. Multiple notification results but steps are taken to prevent it affecting statistics on prevalence.

Australian quarantine.—Any passenger deemed to be suffering from tuberculosis, even in an early stage, is usually prohibited from landing—or a heavy bond is exacted binding him to leave if not recovered at the end of six months.

PROGRESS OF INFECTION IN PHTHISIS. — Tuberculosis causes immunity—the resistance is a very specific matter,—the apparently strong may succumb to it. It is commonly assumed that resistance goes hand in hand with general bodily health. There is a menacing danger of the infection of new areas and everything should be done to avoid this ; absolute rest in bed in the early stages will do it and should be acted upon without fear that the general health will suffer.

Experiments made for the Tuberculosis Commission showed that some degree of immunity to bovine tuberculosis can be induced in calves by injecting them with cultures of Tubercle Bacilli of the human type. Similarly in man the

disease tends to confer some immunity, and it is on the acquisition of the new or improved powers of resistance which are the cause of the immunity slight though they be, that the hope of recovery mainly depends. Experiments showed further that in man, as in the ox, the severity of a tuberculous infection is largely determined by the number of Bacilli gaining entrance at the start. In its tendency to produce immunity tuberculosis differs from other diseases only in degree. During the course of infection the powers of resistance are constantly increasing.—L. ii./10,1539.

FLIES AS CARRIERS OF INFECTION.

The tubercle bacillus from sputum was found to live three days in the fly's intestine, but if a pure culture was used, it could be recovered nearly a fortnight afterwards in the intestine. It has been suggested that *Empusa muscæ*, the parasitic fungus which kills off flies in large numbers in the autumn, might be employed to destroy the flies,—but it would be a difficult scheme to work,—similar ideas with locusts failed.—B.M.J. ii./10,1271.

Prevalence of tuberculous mastitis. Bovine animals suffering from ulcerative tuberculous lesions, especially of respiratory organs, alimentary canal, genito-urinary organs and udder, constitute the chief factor in determining excessive prevalence of bovine tuberculosis in certain districts.—Prof. Delepine, Manchester.—P.R.S.M., Epid. Sectn., Mar., '10,218.

Many chronic diseases such as nervous debility, rheumatism, etc., are thought to be due to toxæmia set up by the unhealthy condition of the large intestine. Such conditions are favourable to the development of cancer and tuberculosis. Metchnikoff advocated the **removal of the large intestine** to invoke healthy longevity. At Guy's Hospital a child, apparently in the last stages of incurable tubercular joint disease, had, as a last resource, all but 9 inches of the lower intestine removed. In a few weeks the internal organs resumed their normal functions and the patient was in apparently good health again. Other cases were operated on with similar success.

The tubercle bacillus can probably enter the body through either the respiratory or digestive route.

Bactericidal action of **gastric juice** (removed by Einhorn tube) on B. tuberculosis. The protection afforded by gastric secretion is apparently by no means perfect. The investigation may have important bearing on portals of entry of the bacillus.—J. Inkster and S. R. Gloyne, B.M.J. ii./21,1024.

Bovine tuberculosis is transmissible to children through ingestion of INFECTED MILK. Evidence of immunisation by the ingestion of living tubercle bacilli in milk is entirely unproven.—Soc. Med. O.H., L. i./21,251.

DEATH RATE in 1916 from tuberculosis 53,858 per annum, from an estimated population of 43,000,000. Next in order of destructiveness comes cancer which is rapidly overtaking consumption.—A. Lapthorn Smith, Pr.,Mar.1921.

Projection of tubercle bacilli by coughing and sneezing. Illustrated preventive propaganda in Germany.—M.P.C., Nov. 15/22,406.

Aetiology, prevention and treatment of phthisis. It needs to be written in the heart of every sanatorium that sputum—contaminated dust of dwellings, streets, buildings and public places, inhaled and ingested with the air and in food—is the most frequent cause. "It is a filth disease" (Simon).—Sir R. Douglas Powell, Pr., Jan. 1922, p. 1.

Social aspect of Tuberculosis.—Jane Walker, B.M.J. ii./23,512. Milk purification (sterilisation) and segregation of the infected.—H. Batty Shaw, *ibid* 513.

Red hair and tuberculosis. A comparison made on 353 bone and joint cases and 610 normals gave a red-haired percentage of 7 for the former and only 3.4 for the latter.—W. C. Rivers, Pr., June, 1921.

Tuberculosis in Wales. Mortality rate on the whole higher. The highest mortality occurs in the sparsely populated mountainous districts of North and West. The mortality tends to the young adult type, especially in north and west areas. More acute than in England. Faulty hygiene cannot explain. An interesting explanation is that where human beings are scattered and isolated, the passing of germs from one to another is more or less restricted except within the home, but where there is herding together and constant association as in towns, germs carried by each are passed on indifferently to his neighbours, but the number of germs so passed on may be, or probably is, relatively small in most cases except in infected houses, hence a relative immunity rather than active disease. Many leave their country homes for London or for the

big industrial centres of Wales itself and many get infected with tuberculosis and go home again to die—perhaps infecting a whole household before the end. Nature is gradually getting rid of tuberculosis by a process of unconscious vaccination.—S. Lyle Cummins, B.M.J. i./22,338.

During the war 40,000 men were discharged from the British army with diagnosis of pulmonary tuberculosis. This was not due to recent infection. It is possible that conditions led to some change in chemistry of the body which enabled tubercle bacilli to attack—in other words the individual became sensitive to this micro-organism.—A. Latham, L. i./22,263. (*Cf.* abstract under bronchial asthma and typhoid).

Retrospect of 40 years in tuberculosis. In the matter of treatment the method of inhalation of antiseptics thought to be the most futile. With regard to Tuberculin there is little hope of the discovery of any drug that can destroy the bacillus without damaging the delicate tissue cells—or reach the microbes entrenched in masses of necrotic tissue, but 'success may ultimately be achieved on these lines.'—Percy Kidd, L. ii./22,1211.

Dogs as carriers of disease to man from animal parasites and tuberculosis (and rabies). Tuberculosis in the dog can be diagnosed by tuberculin injections.—T. W. M. Cameron, L. i./22,564.

The share of the sun in prevention and treatment of tuberculosis.—A. Rollier, B.M.J. ii./22,741.

For the relationship between human and other forms of Tuberculosis and tests to distinguish types of B. tuberculosis see Vol. II.

Hospitals for Treatment of Tuberculosis. The Insurance Act method of dealing with tuberculosis has failed. The lines of prevention laid down are impossible. If the respiratory route is the one by which human tuberculosis is engendered we have no right to ask a number of perfectly healthy men and women to act as physicians, nurses, etc., etc., in institutions for the care of tuberculous pulmonary disease—and in like predicament are the children who play in the streets and inhale the tubercle-laden dust. (Some would make us believe the dust is sterilised by the sunlight—but sunlight is often absent in the British Isles).

If the care of pulmonary tuberculous patients is to be based on the belief that phthisical sufferers especially have caught the infection at a comparatively short time before they develop the signs it is impossible to be logical. No community could stand the application of adequate and ample rules.

Adequate sanatorium treatment for the poor—other than those of the so-called early cases of pulmonary tuberculosis—does not exist. The ultimate fate of these cases is sad in the extreme—they return from a stay in the fresh air to a bed-ridden end under the care of health visitors and tuberculosis officers.

The other way of tackling the tuberculosis problem, however, is the view that *every* member of society *nolens volens* is infected with the tubercle bacillus in early life and only those develop the disease whose soil of their bodies is non-resistant. The great purpose of the Insurance Act based as it is on assumptions rather than on fact, of trying to stamp out tuberculosis by prevention, is rendered null and void by making the advanced tuberculous subject live in his own home. The *advanced* consumptive needs more help than he gets.

The paper concludes with an eloquent appeal for these bed-ridden cases and " to the lasting shame of those of us who are responsible

for the management of this disease, these helpless men, women and children will be sent home for domiciliary treatment, a burden to themselves and their relatives." 'Observation' Hospitals are needed for doubtful cases as also Invalid Homes where those suffering from pulmonary tuberculosis, and who are rendered incapable thereby, may be nursed and treated until they are fit to earn their living or until they die. These Invalid Homes need not be in the country. They may in fact be in the heart of populous centres and therefore near their families without being a burden to them.—H. Batty Shaw, B.M.J. ii./19,97.

Tuberculins.

The use of Tuberculins in general, has fallen off to an extraordinary degree. We are in accord with a writer in the B.M.J. (J. A. Lindsay, B.M.J. ii./18,20) that it is significant that there has been no consensus of opinion either as regards the proper variety of Tuberculin to use or the correct dose to employ.

It has been stated that no less than 200 different Tuberculins have been introduced since Koch made his first preparation.

W. Camac Wilkinson, B.M.J. ii./18,45, in reply to Lindsay, says most tuberculins are valuable but not all are properly standardised. He brings evidence by results at home and abroad.

Value of Tuberculin as an addition to Sanatorium Treatment. The opinions expressed are very reserved. It is not a cure in the ordinary sense and the good effects are at the best exerted almost imperceptibly and over a long period. It is slow in action. Marked reactions are a source of danger. Reactions to 100° F. do no obvious harm but there is no evidence that they are of benefit.—N. D. Bardswell, L. i./15,68.

The preparations now described are **Old Tuberculin, Albumose-Free Tuberculin or T.A.F., Tuberculin T.R., Bacillary Emulsion or B.E., Beranek's Tuberculin, I.K. Tuberculin, Raw's Vaccine, Dreyer's Vaccine,** and certain other modifications.

Haemoptysis. Cases with—never known harm to follow use of Tuberculin. (No details as to kinds used).—E. H. Coleman, B.M.J. ii./16,37.

Struck by the fact that tuberculous subjects in necropsies show a complete absence of malignant growths I. Holmgren found that Tuberculin injections may in some cases be given with advantage to cancerous cases.—B.M.J. ii./16,297.

Absolute rest in cases (comparatively advanced) of pulmonary tuberculosis not insisted upon. A man with temperature 100° F. in six months brought down to normal and at end of 12 months dose of 1 Cc. of Old Tuberculin reached.—A. Moss, B.M.J. i./18,497.

Though used largely during the last ten years Tuberculin cannot be regarded as satisfactory.—E. E. Prest, B.M.J. i./18,58.

Tuberculin, Old, **Tuberculinum Koch. P.G.V.** That of **P. Belg.** is similar.

This is an amber coloured liquid—a mature glycerin broth culture (4 to 5 weeks old) of the tubercle bacillus (*typus humanus*) boiled and concentrated to $\frac{1}{10}$ its volume, from which the dead bacilli are then removed by filtering. The preparation contains the endotoxins yielded by the autolysis of the bacilli and the true excretory products of the bacilli all of which are contained in T.A.F. As it embodies furthermore the toxic products resulting from the breaking up of the proteins in the culture medium which are entirely lacking in specific action and therefore valueless and indeed markedly

contributory to the general reaction it might well be entirely replaced by the A.F. preparation.. It contains no preservative except the Glycerin, about 40%. It is supplied in 1 Cc. bottles. Dilutions are made with 0·5 Phenol Solution.

In the **Standardisation** of this Tuberculin, guinea pigs are injected with a range of doses from 0·05 to 0·3 Cc. of the preparation, and simultaneously a further series of the animals is injected with a standard preparation,—of this 0·1 to 0·25 Cc. usually suffices to kill an animal in 24 hours. If the liquid under examination produces characteristic Tuberculin poisoning in this time the preparation is taken as suitable for use

It has been used (*a*) as a ***Diagnostic*** **both in man and beast,** see p. 928, and (*b*) for treatment.

Effects of Injection.

The tuberculin seems to act upon the tuberculous lesions, and even partly destroys them—it is not definitely destructive to the tubercle bacilli—or their surroundings, and subsequently there is a risk of further symptoms from blood poisoning dependent on this. In many instances the tuberculin has appeared to cause a very serious fall in blood pressure, leading even to a fatal issue; in others the mischief has seemed to be due to a coagulating influence on the blood corpuscles, tending to blood stasis, congestion and hæmorrhage, especially in unhealthy areas adjacent to tubercular deposits; and again, tuberculin does, at times, show an irritant effect, causing inflammatory swellings.

It is stated that by repeating the injection of 0·0002 Cc. and not increasing, unpleasant effects are not seen.

Contra-indications for the injection are laryngo-tuberculosis, cardiac troubles, diabetes, nephritis and pregnancy. In epilepsy and neurasthenia should be given with the greatest caution.

The general reaction usually sets in about 8 to 16 hours after the injection —more or less severe attack of shivering, with headache and pains in the limbs.

At the point of injection, redness appears after 1 to 2 hours, and gradually an infiltration shows itself varying in size from that of a farthing to that of half-a-crown, the absorption of which may take several days.

The height of the reaction is indicated by a profuse outbreak of sweating, a lessening of all the other symptoms and a more or less speedy return of the temperature to normal. Generally the entire reaction is over in 24 to 36 hours. There may be slight lassitude, and in the case of phthisis an increased expectoration, disappearing in a few days.

In lupus patients, besides the general reaction, a local reaction sets in—considerable reddening and swelling of the diseased parts.

Sequels to the injection of Tuberculin. E. Hoke states he has seen herpes zoster, Quincke's œdema, periodontitis, urticaria, polyneuritis, fatal anaphylactic shock follow use of Old Tuberculin.—per Clin. Jl., Dec. 26/23,622.

(b) Treatment with old Tuberculin.

This is now little used for the purpose. Tuberculin A.F., *q.v.*, replaces it. It is however still the starting point in the so-called 'Dispensary' treatment of Camac Wilkinson—*q.v.*

Tuberculous meningitis treated with daily intrathecal injections of 1–3 Mgr. of Old Tuberculin (T.A.) suspended in cerebro-spinal fluid by lumbar puncture.—C. Worster-Drought, M.P.C., June 14/22,514.

Genito-urinary tuberculosis: massive doses of P.T.O.; P.T. and Old T. to 1·5 Cc.—R. Creasy, L. i./20,542.

Unguentum Tuberculin (Old).—

Lupus vulgaris has been diagnosed and treated by use of Old Tuberculin Ointment.—5% of Old Tuberculin in a basis of Soft Paraffin. This is well rubbed in for one to two minutes and is also applied by means of a bandage

to the affected area,—the part being previously cleansed and crusts, if any, removed. On removal of the application, varying degrees of hyperæmia and swelling are seen in the actual lupus tissue, with a moderate amount of hyperæmia with reddish papules extending one or two inches into the surrounding healthy skin (**Moro reaction** *q.v.*). After cleaning the surface, similar applications for treatment are made for the next three or four days, till the lesion closely resembles that produced by the application of a Salicylic Acid Plaster. This typical reaction only obtains in the actual disease and does not extend into the surrounding healthy skin. The pain produced may be considerable.

'**T.O.A.**' *i.e.* **Tuberculin-Original Alt** is a germ-free Tubercle Bacilli bouillon culture (*typus humanus*), resulting from filtering mature cultures. It has been used in the 'Dispensary Treatment,' *q.v.*

Asthma and hay fever have been treated with it on empirical lines, *v.* p. 882.

Tuberculin A.F. (**Albumose-Free**). *Dose* (Initial).—0·00001 Cc. in pyrexial cases; 0·0001 Cc. in apyrexial cases. Subsequent doses are determined from a study of the resulting reactions—constitutional, or general and focal. As a general rule, reactions of any magnitude should be allowed to subside before a fresh injection is given.

A light amber coloured liquid, the product of a 4 to 6 weeks old culture of the bacillus in an albumose-free medium, containing inorganic salts and Citrates, the sole nitrogenous food being Asparagin.

This preparation, as already indicated, may well replace Old Tuberculin.

It is used as *diagnostic* subcutaneously by conjunctival, intracutaneous and percutaneous application.

For treatment it is employed subcutaneously where a fold of skin and under-lying tissues can be raised. Reactions obtained are thought to be specific, and anaphylactic symptoms are excluded in consequence of the absence of non-specific proteins.

Tuberculin 'T.R.' Human, Bovine and Mixed Types.

Dose, initial (subcutaneous)—0.00001 to 0·0001 Cc. according as the case is pyrexial or not, rising gradually to 0·2 or even 1 Cc. Dilutions are made in 1 Cc., using 20% Glycerin as diluent.

N.B.—Doses should be stated in decimals and by no other method.

Although a stereotyped increase of dose is not advised the following scheme will be useful as a guide (reading downwards in each column) :—

0·00001 Cc.	0·0001 Cc.	0·001 Cc.	0·01 Cc.
0·00002 ,,	0·0002 ,,	0·002 ,,	0·02 ,,
0·00003 ,,	0·0003 ,,	0·003 ,,	0·03 ,,
0·00004 ,,	0·0004 ,,	0·004 ,,	0·04 ,,
0·00005 ,,	0·0005 ,,	0·005 ,,	0·05 ,,
0·00006 ,,	0·0006 ,,	0·006 ,,	0·06 ,,
0·00008 ,,	0·0008 ,,	0·008 ,,	0·08 ,,
			0·1 ,,
			0·2 ,,

As a rule weekly injections are given.

Several commercial preparations made on the lines of Koch's directions for T.R. are available.

'**T.R.**' **of Koch** contained ***2 mgr.*** of solid substance ***not*** 10 mgr. as originally stated. An *enormous* amount of confusion was caused

by this and indeed by the use of mgr. basis of dose at all. It may be recalled therefore that :—

0·00001 ($\frac{1}{100000}$) Cc. of 'T.R.' = 0·00002 ($\frac{1}{50000}$) mgr. (or 0·00000002 Gm.) of solid substance.

'Bold' Dose.—The large doses advised by Koch, starting from 0·0002 Cc. and repeated every second day with moderate increase of dose so that a rise of temperature greater than 0·9° F. was avoided—are not now generally administered.

The ***English School*** start with smaller initial dose (as already outlined) and do not look for any marked rises in temperature.

Tuberculin preparations per os. Tuberculin T.R. was given by some workers *per os* with immunising response.

The German **'P.T.R.'** indicated Bovine T.R. (P stands for Perlsucht= Pearl disease *i.e.* tuberculosis of serous membrane of cattle producing pearly nodules or tumours, often pendulous).

A very extensive discussion has taken place on what may be called **Cross-Vaccination**—*i.e.*, as to whether Human or Bovine Type of Tuberculin is to be used in a specific case. The problems as to the relation between human and bovine types are *sub judice*.

General References to Tuberculins and Treatment.

St. Mary's Hospital results of inoculation treatment of tuberculosis. Tuberculous lymphatic glands 79 cases—27 cured, 22 much better, 18 better, 8 are unchanged, and 4 are worse. Best results to be anticipated in young children and young adults between 15–25. Ulcer, sinus and abscess 50 cases treated. 10 cures, 20 much better, 9 better, 8 unchanged and rest doubtful. Treatment averag d 2 years in the successful cases.—B.M.J. ii./09,532.

There is grave danger in giving Tuberculin in phthisis whilst patients are walking about and pursuing their avocations. Tuberculin causes hyperæmia and the more hyperæmic the lesions the more easily will a dangerous autoinoculation be induced by exercise. It is true that cure may be through autoinoculations, but if autoinoculations be allowed to become excessive through Tuberculin and exercise combined, then the disease will inevitably continue. With regard to *length of time* that it *is necessary to continue treatment*:—(1) Patient should be able to take $\frac{1}{5000}$ mgr. 'T.R.' without any effect noticeable either in temperature or index. (2) After sufficient exercise to cause exhaustion there should be no sign of an autoinoculation, *i.e.*, the *Opsonic Index should not fluctuate*.—B.M.J. i./11,132.

Old-standing, semi-quiescent tuberculous cases have yielded in a surprising fashion.—L. ii./11,1626

A course of Tuberculin may be recommended provided the patient has sufficient vitality to yield the requisite response demanded by a proper use of the remedy.—Sir R. Douglas Powell and P. Horton-Smith Hartley, L. ii./11. 1488.

A welcome 'moderate' analysis of about 300 phthisical patients treated with Tuberculin.—L. ii./11,1648.

Uses of various Tuberculin Preparations in pulmonary tuberculosis.—A. Latham, L. i./12,1109 ; B.M.J. i./12,294.

"Controlled" Tuberculin Treatment *v.* Sanatorium (ordinary hospital) treatment. No greater improvement in physical signs in the former than in the latter.—E. E. A. T. Rigg, B.M.J. i./13,213.

Pulmonary tuberculosis treated with Tuberculins at King Edward VII's Sanatorium—good results. 'A.F.' and 'B.E.' used mostly, 'T.A.' and 'T.R. in a few cases. *Initial dose.*—0·0001 Cc. or 0·00001 Cc. according to the case, Dose increased when the last dose given produced no marked general or focal reaction. In increasing the doses the scheme followed is to give 0·1, 0·15, 0·2, 0·3, 0·5, 0·7 Cc. of each of the various dilutions of Tuberculin used. Interval between dose 2 days with higher dilutions, with the lower and the pure preparation 7 days or more.—N. D. Bardswell. L. i./13,750.

With the use of Tuberculin at the King Edward VII. Sanatorium the number of patients who lost their Tubercle Bacilli increased by 17% over what was obtained merely by Sanatorium treatment.—L. i./13,965.

Tuberculin Treatment.—Though much experience with it, still uncertain as to its value. A general survey.—Hector Mackenzie, L. ii./13,521.

Scleritis is probably almost always caused by *B. Tuberculosis.* Tuberculin Treatment (T.R. 1/5,000 mgr.) has been used but may be an extremely dangerous and double edged weapon owing to focal reaction.—T. Harrison Butler, B.M.J. ii./13,979.

In tuberculosis of the iris a patient with a hectic temperature received a small dose of 'T.R.' after the temperature had been brought to normal by rest in bed. The result was disastrous and hastened the inevitable loss of both eyes. Focal reaction in eye cases always does harm.—T. H. Butler, B.M.J. ii./13,980. *See* also S. Stephenson, L. ii./13,1530.

Fever in pulmonary tuberculosis. B.E. in preference for treatment. The dose must be extremely small, 1/100,000 mgr. initially. Its use in some cases produces an immunising effect sufficiently strong to turn an unfavourable course into a more favourable one.—F. J. Wethered, L. ii./13,1046.

For and Against Tuberculin.

H. Batty Shaw says, if it were proven that tuberculous cattle could be cured by vaccination with Tuberculin its use would be widespread in veterinary practice, and its employment would be general in man, but the reports as to cattle do not exist.

He admits that the success with Antityphoid inoculation when brought to bear on Tuberculin treatment is a difficult argument to combat. The advocates of Tuberculin treatment of *established* tuberculosis, or for Vaccine treatment of any *established* infection, feel that if typhoid fever can be reduced in case incidence and in case mortality by vaccination before the disease is developed, it should be able to be controlled by vaccination after the disease is developed. Figures have yet to be published to prove this speculation. Antityphoid amboceptors developed in a healthy individual before he contracts typhoid are ready to digest the bacilli as they arrive. If Tubercle Bacilli, on the other hand, gain access to the body they surround themselves with an almost impenetrable ring of fibrous tissue, caseous or calcified material, then any subsequent development at a remote part, *e.g.*, of the skin or subdermic tissues, of 'sessile' tuberculin or tuberculo-amboceptors by means of injections of Tuberculin or Tubercle Bacilli, may be quite unable to reach the Tubercle Bacilli.—B.M.J. i./13,921. J. W. Allan supports this and enquires as to decided and cumulative effect on the pulmonary lesions.—*ibid.* p. 1140.

Sir F. C. Eve's reply to the above was that observation by the clinician is more reliable than theories. He suggested that the experiments must be continued on a larger scale, which he believed would reverse the Author's opinions. He said, if clinicians find as a matter of fact (as he did) that Tuberculin does a large amount of good, it becomes the duty of theorists and experimentalists to modify theory and find the reason of the discrepancy in the animal experiments.—B.M.J. ii./13,47.

E. H. Fenwick writes that he cannot point to a single cure with Tuberculin, but it is a useful remedy. It acts best in women. Often dangerous in widespread tuberculosis such as genito-urinary tubercle. Its use is restricted.—B.M.J. ii./12,857.

The ideal Tuberculin has not yet been found and the method of its action on healthy and unhealthy cells respectively has not been satisfactorily worked out. *In spite of all research the treatment of any individual case must be more or less of a leap in the dark.*—Editorial, B.M.J. ii./13,1243.

Graduated Labour Treatment—'AUTOINOCULATION.' Curative effects are produced in quite early pulmonary tuberculosis by means of artificial auto-inoculations by allowing the patient to take *sufficient* exercise.

It has been criticised as largely a hypothetical process. Rise in temperature as result of exercise, occurs in normal persons. It may be the tuberculous person's temperature rises more readily than that of the healthy man. Work is no more a specific for consumption than rest or Cod Liver Oil.

Combined type of tuberculins plus B. Coli found capable, especially in tubercular disease of the bones, but certainly, if judiciously given, in any tubercular disease—of giving extraordinary sense of well-being and comfort with, as a rule, improvement in appetite.—R. Robertson, Pres., Feb., '20.

Tuberculin treatment. Focal reaction important. Dose should be regulated so that 'lumps' at the seat of injection do not form. One must find the tuberculous content of the patient before the disease can be attacked successfully.—R. Robertson, Pr., May 22/354.

Living attenuated tubercle bacillus 0·1 to 2 mgr. used in treatment of tuberculosis without ill effect. 'Vital-tuberculin'—crushed tubercle bacilli—also used.—B.M.J.E. ii./21,9.

Opsonic Index. For a note on this factor see *Vol. II.*

Tuberculin Bacillary Emulsion, 'B.E.' (Human Type, Bovine Type, or the two mixed are available).—*Dose.*—0·00001 to 0·00002 Cc. as a rule to begin with. For further details see p. 923.

As proof of the immunising properties of his "T.R." and other preparations Koch demonstrated the production of specific immunising bodies which he called *Agglutinins.* These bodies have the power of precipitating emulsions of triturated Tubercle Bacilli. Such Agglutinin-containing preparations were thought to be of great value as indicating the commencement of the healing process. As Agglutinins develop their action *in vitro* chiefly on emulsions of Triturated Tubercle Bacilli, an emulsion of this kind was advocated for treatment to stimulate the production of Agglutinins. It was found that many tuberculous patients, especially serious cases, showed no Agglutinins at all. It is satisfactory therefore to view Agglutinins as immunising in the blood bodies indicating the commencement or progress of the immunising process, but which necessarily become absorbed or otherwise disposed of by the bacillary originators of the infection. 'T.R.' was found not invariably capable of increasing the power of agglutination of patients' sera,—this he thought due to the fact that the soluble substances rejected in the manufacture should be retained. The difference between 'B.E.' and 'T.R.' is that B.E. contains the *entire body substance of Tubercle Bacilli* whilst with T.R. the *soluble constituents* of the Bacillus are first rejected. The soluble Endotoxins are thought to play an important part in the production of Agglutinins and are contained in 'B.E.'

'B.E.' is, therefore, a suspension of entire pulverised Tubercle Bacilli in a mixture of equal parts Glycerin and Water. 1 Cc. contains 5 mgr. of thoroughly dried Tubercle Bacilli.

The dose is increased carefully at a rate which causes little or no rise in temperature (1° F.) and with intervals of about 1 week. With the small initial dose stated it is very exceptional for any reaction to appear. Should a rise occur, the dose should not be exceeded and temperature must have reached its previous level.

Table for conversion of Doses of Bacillary Emulsion ('B.E.') Human or Bovine, or mixed Human and Bovine, into equivalents of 'Bacillary Substance.'

0·00001	(1/100,000)	Cc. =	0·00005	(1/20,000)	Mgr.	Bacillary Substance.
0·00002	(1/50,000)	Cc. =	0·0001	(1/10,000)	Mgr.	,,
0·00003	(3/100,000)	Cc. =	0·00015	(3/20,000)	Mgr.	,,
0·00004	(1/25,000)	Cc. =	0·0002	(1/5,000)	Mgr.	,,
0·00005	(1/20,000)	Cc. =	0·00025	(1/4,000)	Mgr.	,,
0·00006	(3/50,000)	Cc. =	0·0003	(3/10,000)	Mgr.	,,
0·00008	(1/12,500)	Cc. =	0·0004	(1/2,500)	Mgr.	,,
0·0001	(1/10,000)	Cc. =	0·0005	(1/2,000)	Mgr.	,,
0·0002	(1/5,000)	Cc. =	0·001	(1/1,000)	Mgr.	,,
0·0003	(3/10,000)	Cc. =	0·0015	(3/2,000)	Mgr.	,,
0·0004	(1/2,500)	Cc. =	0·002	(1/500)	Mgr.	,,
0·0005	(1/2,000)	Cc. =	0·0025	(1/400)	Mgr.	,,
0·0006	(3/5,000)	Cc. =	0·003	(3/1,000)	Mgr.	,,
0·0008	(1/1,250)	Cc. =	0·004	(1/250)	Mgr.	,,
0·001	(1/1,000)	Cc. =	0·005	(1/200)	Mgr.	,,
0·002	(1/500)	Cc. =	0·01	(1/100)	Mgr.	,,
0·003	(3/1,000)	Cc. =	0·015	(3/200)	Mgr.	,,
0·004	(1/250)	Cc. =	0·02	(1/50)	Mgr.	,,
0·006	(3/500)	Cc. =	0·03	(3/100)	Mgr.	,,
0·008	(1/125)	Cc. =	0·04	(1/25)	Mgr.	,,
0·01	(1/100)	Cc. =	0·05	(1/20)	Mgr.	,,
0·02	(1/50)	Cc. =	0·1	(1/10)	Mgr.	,,
0·04	(1/25)	Cc. =	0·2	(1/5)	Mgr.	,,

To convert the above 'Bacillary Substance' stated in decimal part of a milligramme into decimal part of a Gm., carry the decimal point three places to the left. Thus 0·00005 Mgr. = 0·00000005 Gm.

Dilutions are best made with 0·8% Sodium Chloride and 0·5% Phenol. A 1% Dilution of the original is sometimes called "Dilution No. 1," a 0·1% Dilution is No. 2 and so on. It is not used as a diagnostic.

Bold Dosage (*cf.*, p. 920), was advocated by the German school. Starting with the same initial dose (0·00001 to 0·00002 Cc.), at one or two days' interval, the dose was rapidly increased from twice to five times the dose at each injection, until definite reaction appears with a rise of 2½ to 5° F. in temperature. As soon as such violent reaction develops much longer pauses, 6—8 days, were made. The injections were increased until the dose reached 4 Cc. of the undiluted B.E. Koch regarded the immunisation as complete only when the patient could tolerate this injection without reaction. The larger doses of 2 to 4 Cc. were only injected at intervals of 2 to 4 weeks.

In exceptional cases (***English dosage***) the initial dose may be as minute as 1/1,000,000 mgr. bacillary substance with gradual rise —the limit being—1/500 mgr. Bacillary substance (=0·0004 Cc.). *Average doses* are respectively 1/20,000 mgr. (=0·00001 Cc.), 1/5,000 mgr. and 1/2,000 mgr. diluted in 1 Cc.

Papular eruption following the injection of 'B.E.'—A.J.M. Grant, L. ii./18,15.

Tuberculosis treated by **Insufflation** of bacillary emulsion of dead tubercle bacilli, 1/5000 to 1/40 mgm. 3 times a week—results encouraging.—O.F. Paget, per Clin. Jl., April 18/23,192.

I.K. (Immune Körper) Tuberculin.—*Syn.* Spengler's Tuberculin manufactured at Davos (Switzerland).

The preparation is stated to have an antitoxic action, neutralising the poison of the bacillus and a lytic action which impairs or destroys the vitality of the bacteria. It contains besides immune bodies against the T.B. and other organisms associated with it.

Dose.—1 Cc. of 1 in 10 million dilution of the preparation gradually increased (to 1 in 1 million, 1 in 100,000, etc.), to 1 Cc. of the preparation; the diluting fluid being sodium chloride 0·5 Gm.; Phenol 0·5 Gm., Distilled water to 100 Cc.

According to Spengler the red blood corpuscles (not the serum) are the site of production and collection of the protective substances in a number of infectious diseases, *e.g.*, in tuberculosis. This suggested the use of tubercle-immune blood obtained from rabbits immunised against strains of human tubercle bacilli. A vein of the animal is punctured and the blood received into Carbolised Saline Solution containing Lactic Acid. The treatment is, therefore, a 'passive-active' immunisation. See also Treatment of Tuberculosis by W. H. Fearis (John Murray) and L. i./12,194.

Laryngeal Tuberculosis treated with various Tuberculins including 'I.K.,' 'P.T.O.' and Old Tuberculin, with remarkable results.—W. Camac Wilkinson.—B.M.J. ii./10,1705, *cf.* Tuberculin Dispensaries.

Beraneck's Tuberculin consists of a mixture of tubercle-broth filtered free from bacilli and concentrated *in vacuo.* with an extract of the bacilli made with phosphoric acid. It is stated to contain exotoxins and endotoxins and acts like a vaccine, strengthening the bacteriolytic power of the protective cells; it also exercises a bactericidal or attenuating effect on the Tubercle Bacillus.

It is supplied in 6 dilutions $T.Bk_1$, to $T.Bk_6$. *viz.*, 1 : 10 to 1 : 1,000,000 for use.

Tuberculosis Immunising Vaccine (Nathan Raw). *Syn.* **Tubercle Vaccine 'R.'** N. Raw states that virulent tubercle bacilli—after fourteen years of subculturing—can be attenuated to such a degree as to be avirulent and non-pathogenic to highly susceptible animals. In his opinion this remedy should be of greatest value, not only in curing the disease, but also in its prevention, by protecting the human body against attack.

Raw says that cattle can be rendered immune to virulent bovine bacilli by previous inoculation with virulent human bacilli. There is a marked antagonism in the human body between human and bovine infections. These two organisms cannot flourish in the body at the same time.

Extended clinical investigation at Liverpool showed that the human body is attacked by two quite distinct forms of tubercle—the one conveyed by direct infection and attacking chiefly the lungs (so-called consumption); the other, the surgical form, conveyed by milk from tuberculous cows and developed in the first few years of life. A vaccine made from bovine cultures should be used in the treatment of human infections and *vice versa.*

Raw's Vaccine is a bacillary emulsion of the bacilli containing all the products of the bacillus. It is non-toxic and avirulent, and produces no reaction even in large dose.

Dose recommended.—0·001, 0·002, 0·003, 0·004, 0·005 and 0·006 mgr. for immunising susceptible children at weekly intervals, repeated in three months.

For *treatment* of the active disease, commence with 0·001 and increase to a maximum of 0·025 mgr. Twelve injections should be given at intervals of seven days. Vaccine should be freshly made. Results in suitable cases excellent.—N. Raw, B.M.J. i./21,595, L.i./21,693.

Human type Tubercle bacilli, generally speaking, attack lungs and larynx while the bovine type attacks the alimentary system and its glands. Pulmonary tuberculosis is caused by the human type in 90% of cases and is always primary. The remaining 10% are secondary to a primary infection by the bovine bacillus and are either an extension from the cervical glands downwards to the apex or an extension upwards from the abdomen.—From a paper 'What we do *not* know regarding Tuberculosis.'—N. Raw, L. i./21,1305.

Results of treating 88 cases of tuberculosis with N. Raw's Vaccine during 12 months. A specific remedy does not yet exist which will effectively destroy tubercle bacilli in the body. The use of cultures of very low virulence is of prime importance. The growths employed in making this vaccine, subcultured every month for 15 years (184th generation), are quite non-tuberculigenic and completely non-pathogenic to animals.—N. Raw, Pr., Apl. 22/229.

Tuberculosis Immunity. Every person receiving a mild tuberculous infection is immunised, either partially or completely, for some time (probably not more than a year). In civilised communities nearly all adults have been infected, infection occurring in most cases during childhood. This infection endows the organism with heightened resistance against infection with tubercle bacilli. The immunity thus produced is usually sufficient to protect them against reinfection during the rest of life, but when this immunity fails new tuberculous foci develop. A very small amount of vaccine prepared from cultures of tubercle is sufficient to produce immunity for a limited time, and this should be used as a prophylactic measure in children who have been exposed to infection. In the treatment of clinical tuberculosis an immunising vaccine has given excellent results. By directly counteracting the toxic effects of the bacilli within the body, temporary immunity is induced, allowing the affected organs time to recover. As a result of the treatment of over 3,000 cases of tuberculosis with every preparation of Tuberculin, the author is convinced that a vaccine prepared from an attenuated and non-pathogenic culture, free from all toxins, gives far the best results.—Nathan Raw, Pr., Nov. 23, 317.

Dreyer's Tuberculosis Vaccine. *Syn.*, ✱**Daccol** (T.M. 400418), **"Defatted" or "Diaplyte" Tubercle Vaccine.** Dreyer assumes the absorption of bacterial antigens is hindered by the fatty envelope by which the body of certain kinds of bacteria is surrounded. If antibodies are to be produced, it is essential that the antigen should come into intimate contact with the cells of the body of the patient.

Antibody formation has been more readily evoked by injecting Gram-negative bacteria, while comparatively little success has been obtained by the inoculation of emulsions of acid-fast or Gram+ varieties.

In making this vaccine, tubercle bacilli, obtained from a glycerin broth culture, are first treated with formalin and then defatted with Acetone; they are finally ground up with sterile saline and centrifugilised. The supernatant fluid is pipetted off and, when diluted with saline containing formalin, constitutes the defatted antigen suspension. It is entirely non-acid-fast.—Georges Dreyer, B.M.J. i./23,1059,1065.

Dose.—The Vaccine is made in four dilutions, containing respectively 1/10,000 mgr. of the dried "defatted" bacilli per Cc.: 1/2,000: 1/250 mgr. per Cc., and 1/50 mgr. per Cc. 5 Cc. of the weakest (Green Label) are advised first, commencing with 1/10 Cc. An interval of 4 to 5 days should intervene between successive doses. Each succeeding dose should be double the pre

ceding, so long as no undesirable reaction results. In the event of reaction, the interval before the next dose should be prolonged for 2 or 3 days and the dose should be slightly reduced. When the first 5 Cc. (Green Label) have been given, the next dilution (Black Label) should be proceeded with, commencing with an initial dose of 1/10 Cc., and doubling the doses or only slightly increasing them as the symptoms may indicate; and then the third dilution (Blue Label).

The fourth, strongest dilution (Red Label) is also commenced with 1/10 Cc. The interval can now be increased to 5 or 6 days or more, depending upon the patient's condition. Avoid sudden increases in dose. The initial dose recommended is safe even in febrile cases.

In 3 guinea-pigs infected with tubercle bacilli of human type the course of the disease was stayed by the injection of defatted antigen. In cases of tuberculous disease of the glands and skin, the results of the treatment have surpassed any known to have been attained regularly with other methods. Encouraging results in septic infection, especially in puerperal fever. Medical Research Council arranging for extensive trials at various centres.—Leader, L. i./23,1321.

Lipoids include fat-like substances, differing from normal fats in containing Nitrogen or Phosphorus, or both. The acid-fast properties of tubercle bacilli are usually attributed to the waxy substances, which, however desirable to remove *in vitro*, are not included in the lipoid, phosphatide or lipin group of substances. Criticism of Dreyer's nomenclature.—J. A. Shaw-Mackenzie, B.M.J. ii./23,263.

Spahlinger's Serum.

In Spahlinger's 'passive immunisation' the various toxins serve for preparation of three types of 'partial' sera. These together constitute his anti-tuberculosis serum.—L. i./22,5. See also strong criticism.—S. Lyle Cummins, *ibid.* 98.

Offers from this country to assist him financially if scientific proof for his claims is available.—B.M.J. i./23,831.

Spahlinger's work—criticisms.—B.M.J. i./23,938.

Earlier references; L. i./21,397,448. Secrecy regarding.—Addison, *ibid.* 563.

Tuberculin Dispensary Treatment.—W. Camac Wilkinson read a paper at the B.M.A. Meeting 1910. He reviewed the contraindications usually accepted and pointed out that Tuberculin acted like magic in cases of hæmorrhage, apart from complications. Hæmorrhage might be the first sign of a mixed infection, in which case Tuberculin would be contra-indicated, but by the mixed infection, not by the hæmorrhage. In his view Tuberculin treatment is analogous with the use of Haffkine's Fluid or similar agents in plague, cholera or typhoid. Tuberculin never failed when Sanatorium methods succeeded. In the first stage pulmonary tuberculosis could be cured with certainty by Tuberculin, in the second permanent results are obtained in 40 to 60% of cases. A further paper dealing with laryngeal tuberculosis; some remarkable results are described. Only early or suspected cases are suitable for this form of—Dispensary—treatment. The treatment should be refused to all presenting evidence of mixed infection. Tuberculin Dispensaries established in various places—Aldershot, Street (Somerset), Irvine, and others proposed both for treatment and diagnosis in case of contacts.—(Leader) B.M.J. i./11,265.

Details of the 'Tuberculin Dispensary League'—the chief Dispensary being at 263, Kennington Road, London, S.E. It is estimated that about 40,000 persons suffer in London from consumption and cannot obtain Sanatorium treatment, which can only deal with about 1,000 a year.—B.M.J. i./11,287,340.

The method has been considerably discussed.—Refs. to literature in our last Edn., p. 894.

From a study of his papers his usual treatment is *first a course of 'P.T.O.', then 'P.T.' (may be repeated courses), then Tuberculin Old—or more recently Tuberculin 'A.F.'*

"The dosage (at the Portsmouth Municipal Tuberculin Dispensary) is approximately as follows:—First dose of 'P.T.O.' is from 0·00025 *to* 0·005 *Cc.—increased gradually to* 0·5 *or* 1 *Cc. When this has been reached without reaction (over* 100° *F.) P.T. (which is said to be* 40 *to* 50 *times as powerful as P.T.O.) is given, i.e., after* 0·5 *Cc. of 'P.T.O.' the usual dose of 'P.T.' will be* 0·01 *Cc.*

until 0·5 to 1 Cc. is taken without reaction, when a short course of Old Tuberculin with a maximum of 0·5 to 1 Cc. is injected."

In support of large doses of Tuberculin subcutaneously.—W. Camac Wilkinson, B.M.J. i./23,675.

Regarding **Municipal Tuberculin Dispensary Treatment,** we provided a number of abstracts of the literature in our last Edn., p. 895.

Pulmonary tuberculosis treated with Tuberculin. Method of Camac Wilkinson used as above outlined. In all about 40 injections were given, lasting over a period of six months; good results obtained.—W. Stobie, B.M.J. ii./22,473.

Tuberculin "offers a certain cure in 90% of early cases." Four essential points: (i.) Not to be given when patient has intermittent or continuous pyrexia. (ii.) Dose to be given twice a week. (iii.) Persistence until large doses are reached. (iv.) Temperature taken four times a day. Recommends beginning with P.T.O. 0·0005 Cc. gradually increased to 1 Cc., then P.T. 0·005 Cc. increased to 1 Cc., then Old T. 0·05 Cc. increased to 1 Cc. After a reaction, *i.e.*, either general (rise in temperature, nausea and perhaps vomiting) local, or focal at site of tubercular disease, no further doses should be given for one week. Then, unless the reaction is unusually severe, the same dose should be given. In a few very sensitive cases it may be necessary to begin with as little as 0·0000002 Cc. T.A.F. Minimum time for first course, five months. —Rolf Creasy, Jun., M.P.C., Jany. 24,23,66

Normal Horse Serum.—*Syn.* **Antilytic Serum,** HORSE PLASMA (LIQUID) is supplied in 10 and 25 Cc. vials. *Dose.*—1 to 2 drachms. Employed to increase the amount of "complement," according to Ehrlich's theory. In tuberculosis has been recommended as an ideal food, also in typhoid; the horse is immune to the former disease. Sheep's plasma is equally satisfactory.

(Byno-plasma contains 1 drachm sheep's plasma in every ½ ounce.)

A dose of tuberculin in 10 Cc. of NORMAL HORSE SERUM is less likely to cause the rise of temperature than the same dose in 10 Cc. of Saline.

Treatment of Chronic Gastric and Duodenal Ulcer.—The serum is given by the mouth 3 or 4 times daily directly after food in ½ ounce of water. 60 or 80 Cc. may be given in 24 hours. The serum must be fresh or serum deprived of its globulins thus rendering its antilytic value artificially increased. A fair idea of the potency of the Serum can be gained by observing its action on an old long-standing wound—if it does not produce a good reaction in 24 to 36 hours it is useless for the purpose.—E. C. Hort.

"Antilusin" 'A' for use *per os* and **"Antilusin" 'B'** for local application, are preparations of this kind.

Ulcers, superficial, do well with a dressing of sterile gauze soaked in sterile Normal Serum. Hæmophilia is treated with it.

In treatment of gastric and duodenal ulcer should never be given to starving patients or on an empty stomach. In chronic cases 10 Cc. three or four times a day for a month immediately after food in ½ ounce of cold water is best. It should be stored in a cool place (preferably on ice). After a month gradually drop the treatment..—E. C. Hort.

The scope of Normal and Immune Serum in Treatment.

It must be remembered that the utilisation of an individual's own serum has been practised from time immemorial,—whenever artificial hyperæmia has been set in motion by light or heat baths, by poultices and stupes, by Bier's treatment, stimulating lotions and liniments, by painting the skin with Iodine, by blisters, etc., there this form of artificial normal serum therapy has been in use. There is no doubt that Normal Horse Serum exercises at times a powerful stimulus to increased resistance in some infective processes. Normal Horse Serum is advocated in diseases including ulceration of the stomach and other organs, various kinds of purpura, pernicious anæmia, etc. By intravenous or subcutaneous injection Normal Serum was of great value in arresting hæmorrhage in severe cases of true hæmophilia and of some forms of purpura, the results being attributed to acceleration of coagulation time.—B.M.J. ii./11,667.

Hypersensitiveness to horse serum—5 Cc. caused death.—F. B. Gurd and E. Emrys-Roberts, L. i./20,763.

Scarlet fever well treated with immune human serum. Constant fall in temperature and rapid improvement in general condition of patient immediately after administration of serum. Convalescent serum almost specific during early stages of disease.— G.H. Weaver, per Jl. Trop. Med., May 1/22,119.

Coagulose.—A dried serum containing the fibrin ferment required to coagulate blood—used in hæmorrhage hypodermically after re-dissolving.

Haemostatic Serum. *Syn.* **Haemoplastin.** *Dose.*—1 to 2 Cc. injected intravenously or subcutaneously and repeated every 4 to 6 hours until hæmorrhage controlled. A serum derivative stated to promote clotting of the blood.

Hémostyl. Obtained from the horse by bleeding the animal during the regenerative phase which follows a hæmorrhage. The hæmopoietic properties of the serum are increased during this period.—L. i./21,1310.

***Incitamin.** (T.M. 410823). A remedy for treatment of slowly healing sores. A preparation composed of horse serum treated with trypsin and freed from coagulable substances, horse saliva and Carbolic Acid—used in the form of poultices. A thick, well-wrung gauze compress is placed over the sore and covered with waterproof sheeting.—J. F. Fisher, B.M.J. i./21,179, 288; L. ii./21,933.

TUBERCULIN REACTIONS FOR DIAGNOSIS.

Subcutaneous test.

The test in the human being (*not usually considered safe*).

An initial dose of 0·2 Cc. of a 1 in a 1,000 dilution of old tuberculin is injected subcutaneously. If no rise of temperature follows, give 1 Cc. of a 1 in a 1,000 dilution at least 48 hours later. If again no rise of temperature occurs give 0·5 Cc. of a 1 in a 100 dilution. Finally, if necessary, 1 Cc. of a 1 in a 100 dilution. A rise of 2·3° F. or more occurs in tuberculous subjects, some 6 or more hours after the injection of tuberculin.

The test for veterinary use.

The animal is confined to its stall for 24 hours before the injection is made and its temperature observed. 3 to 4 Cc. of a 1 in 10 dilution are injected subcutaneously in the neck. The temperature is taken 6, 9, 12, 15, 18, 24 and 36 hours after inoculation. If there is a rise of temperature of 1·4° C. or more the animal should be regarded as tuberculous. With a rise of temperature from 0·8—1·4° C. the diagnosis is doubtful and the test should be repeated after one month.

N.B.—This test has been proved to be of the utmost value for the diagnosis of tubercular infection in cattle. Occasionally in animals with advanced infection the test is negative. In these cases, however, the diagnosis can usually be arrived at by other means. In a few cases, in animals suffering from echinococcus infection a slight positive reaction has been obtained.

After a dose of Tuberculin in cattle, a further dose during six months may fail to again produce a rise in temperature.

Tuberculin Tests of Cows. Unless test be carried out with most scrupulous care doubtful results are numerous.—Capt. S. R. Douglas, L. ii./22,929.

As diagnostic, stated to be reliable. Tubercle can be stamped out from our herds.—Professor S. H. Gaiger, B.M.J. ii./22,961. Further refs. last Edn.

Cutaneous test (von Pirquet). Cleanse the inner side of the forearm with ether and alcohol. Make two similar scratches with a sterile needle 3 inches apart (avoid drawing blood). On one scratch, place a drop of 1 in 4 old tuberculin in sterile water (pure old tuberculin is sometimes used), keep the other scratch as a control. Examine at 12, 24 and 36 hours. A positive reaction occurs in

from 3–24 hours and is usually at its height at 36–48 hours. The skin becomes red and slightly raised on each side of the scratch over an area 10 mm. broad, reactions under 5 mm. should be regarded as doubtful.

A delicate indicator of tuberculous infection in childhood.—It does not fail even in massive tuberculous disease.—C. McNeil, B.M.J. i./23,673.

Intradermic test (Mantoux). Intradermic injections of 0·1 Cc. are made into the cleansed forearm of :—

1. Normal saline (the same as is used for diluting the tuberculin).
2. 1 in 10,000,000 old tuberculin in normal saline.
3. 1 in 1,000,000 ,, ,, ,,
4. 1 in 100,000 ,, ,, ,,
5. 1 in 10,000 ,, ,, ,,

A positive reaction appears in 6–8 hours, maximum 24–48 hours, subsides 6–10 days.

The skin at the site of inoculation becomes infiltrated and hyperæmic in severe reactions vesiculation occurs. (Routine tests may be made with No. 1 and 4 only).

Percutaneous test (Moro). An ointment made of lanolin and old tuberculin in equal parts is rubbed on to the skin of the chest. A positive reaction is shown by the development of reddening and papules.

Ophthalmic test (Calmette). This test has been given up owing to the occurrence of severe accidents. A 2% solution of a specially prepared tuberculin is dropped on to the conjunctiva. A positive reaction is shown by the appearance of reddening of the inner canthus caruncle or even the entire conjunctiva, often accompanied by swelling of the lids. The tuberculin employed is prepared by precipitating old tuberculin with absolute alcohol and suspending the deposit in normal saline.

Tuberculin Ointment (for percutaneous use—Philip). Tuberculin Original Koch 10 to 50, Eucalyptol 5, Eucerin to 100; Beraneck's Tuberculin is also suggested.

Percutaneous exhibition of Tuberculin exerts a remarkable influence on the first buddings of tuberculosis in childhood. Continued observations, over long periods, show it is capable of effecting the nearest approach to *de*tuberculisation yet realised. Used as diagnostic and therapeutic agent, the twofold aspect must be kept steadily in view. The local stimulation by Tuberculin at each tuberculous focus is an important step. When Tuberculin is rubbed firmly into the skin of a tuberculous patient it is freely absorbed and exerts a specific curative influence. Generally, a 25% preparation is convenient. In young subjects, or where there is doubt as to the number and extent of foci involved, begin with 10%. The actual amount of Tuberculin used in a straightforward case (using, say, 25% dilution) may be approximately 0·1 Cc. The ointment containing this quantity is rubbed (worked) into the cleansed skin, over an area of 1 or 2 square inches, by means of a small glass rod. Repeat once weekly.—Sir Robert Philip, B.M.J. i./23,493.

Tuberculin Old or P.T.O., or equal parts of both, mixed with Compound Camphor Liniment in proportion of 1 to 5 minims to 1 drachm, used for local application, *e.g.* in abdominal disease or pulmonary tuberculosis. An ointment using Anhydrous Lanolin employed for lupus or adenitis.—J. Crocket, B.M.J. i./22,679.

For the Serum Diagnosis of Tuberculosis see Vol. II.

Typhoid Fever, Anti-Typhoid Inoculation.

The fact that in China enteric fever in epidemic form rarely occurs is, according to one authority, due to the fact that the Chinese drink tea (which implies boiling water) instead of water, congee instead of milk, and that uncooked food is seldom taken.

In the war each nation initially employed for immunising purposes preparations of the *B. Typhosus* alone without realising the importance of the Paratyphoid organisms.

The vaccine had to be amended to include the latter when the overwhelming preponderance of Paratyphoid infection was realised. Sir W. H. Willcox (L. i./16,454) for example in detailing his experience in the Dardenelles Area of a large number of cases, states that while Typhoid cases were 13·5%, Paratyphoid constituted 86·5%. The Paratyphoid on subdivision gave 'A' 47·5% of total, 'B' 29% and non-agglutinable Paratyphoid 10%. In fact the Paratyphoid cases were in his judgment considerably more than 6·4 times as numerous as the cases of typhoid. In arriving at the 86·5% (122 of the 144 cases analysed) this percentage concerns the first 141 cases from which the organism was isolated from the blood and about which there could be no question as regards diagnosis. In this paper details are given as to the discovery of the organisms, agglutination reactions, clinical symptoms of the fever (division into three groups) and prophylaxis. It is stated that in normal times in the past paratyphoid has been a relatively uncommon disease. Paratyphoid infections in the Boer War were more prevalent than believed at that time. The virulence of the paratyphoid organisms is much lower than that of *B. Typhosus* or thousands of lives would have been thrown away. It has been found as one of the lessons of the great war that the actual presence of an epidemic or the impending entrance of the inoculated into a zone of infection was no contraindication whatever to prophylactic inoculation.

The immunity created by prophylactic inoculation with this **'T.A.B.' Vaccine** remains at a high level for at least six months—probably for twelve months, and should an inoculated person contract the disease, its severity is greatly diminished and the percentage mortality rate is lowered.

With regard to diagnosis the findings of the Widal Test had to be corrected—a single positive test being of no value but a careful study of the agglutination curve for the several organisms was proved to be essential for correct diagnosis in cases which had been inoculated with T.A.B.

IMMUNITY IN ORIENTALS. The nervous system of Orientals is much more resistant to the effects of germ infection than that of Occidentals. Specific immunity to typhoid demonstrated in 15·5% of the people. Racial immunity acquired as a result of continued use of infected water and food supply.—R. W. Mendelson, per Jl. Trop. Med., June 15/23,219.

Typhoid Vaccines are supplied in the following forms :—

For Immunising :—

No. 1. Agar cultures of Typhoid and Paratyphoid 'A' and 'B' organisms.

No. 2. Broth cultures of Typhoid and Paratyphoid 'A' and 'B' organisms. Ampoules of both contain 500, 1000 and 2000 millions of each organism.

Special care is taken to ensure little or no diminution in their potency at the end of at least 12 months.

These doses either of the Agar or Broth Cultures should be given in series at intervals of not less than 7 days ; the interval of 10 days

is to be preferred. An interval of 14 days is even better. The dose is given *subcutaneously* into the tissues of the upper arm just below the insertion of the deltoid.

For children the dose may be on the lines of Gaubius' Dose Table. Thus a child of 7 would receive 1/3 average dose.

According to a report to the Medical Research Committee by G. Dreyer, A. Duncan Gardner, A. G. Gibson and E. W. Ainley Walker —(see L. i./18,498)—on Prophylactic Typhoid plus Paratyphoid inoculation (T.A.B. vaccine) 1000 million Typhoid and 750 million each 'A' and 'B' per Cc. should be given in doses of 0·5 and 1 Cc. as first and second dose to ensure protection. The interval between the first and second dose should be lengthened from 10 days to 18 or 20 days.

Technique.—Rub the area with antiseptic solution. A good fold of skin and underlying subcutaneous tissues is lifted firmly between the left thumb and forefinger and the needle plunged boldly and quickly to the depth of *about an inch*, the tissues released and the injection given slowly into the tissues. The puncture may be touched with weak antiseptic or dried and a little collodion applied.

The patient should take no alcohol whatever during the 24 hours preceding and after the injection.

Contraindications.—Alcoholics react more strongly than others. Kidney disease requires caution and there is possibly slight risk in the case of old standing tuberculosis.

Effects.—Tenderness at the place of inoculation is at its worst in about 18 hours. Redness may be caused. Give free use to the arm the day after injection. Malaise begins in about 6 hours. Occasionally a rigor. There is usually headache and a slight degree of pyrexia. Occasionally temperature up to 101° F., rarely 103° F.

Castellani's Tetravaccines : Typhoid + para-Typhoid "A"+ para-Typhoid "B"+Cholera ("T.A.B.C.") also the same with M. Melitensis in place of the Cholera Vibrio ("T.A.B.M.") and his **Pentavaccine** (Typhoid+para-Typhoid "A"+para-Typhoid "B" +Cholera+Malta Fever) have been considerably used. Experiences with T.A.B.C. and T.A.B.M.C. in Serbia. Inoculated persons developed antibodies to the diseases named.—G. A. Lurie, B.M.J. i./16,45.

The same worker's **Hexavaccine :** Typhoid, 500 million, Paratyphoids "A" and "B" 250 million each, V. Cholera 2000 million, B. Pestis 500 million and M. Melitensis 2000 million per Cc. (T.A.B.C.P.M.) with an initial dose 0·5 Cc. and double the amount a week later—is thought to be still in the experimental stage—experiments will be continued. This if found efficient would constitute the ideal vaccine for use in the tropics.—B.M.J. ii./17,357.

Combined preventive inoculation against typhoid, paratyphoid and bacillary dysentery. Dysentery vaccine completely sensitized with a heated polyvalent dysentery serum.—G. P. Johnson and A. J. Milne, B.M.J. i./16,88.

Results of inoculation against typhoid over a period of years. Eloquent proof of the value of inoculation.—Pr. McWeeney, L. i./15,265.

Incidence of Typhoid among the inoculated is only 0·2%, among the uninoculated it is 30%. Strength of prophylactic injection usually 1000 million followed by 2000 in 10 days.—F. C. Madden, L. ii./15,271.

A new germ of Paratyphoid.—L. Hirschfeld, L. i./19, 296.

Triple typhoid vaccines made in the Laboratories of the Roy. Nav. Med. School, Greenwich, with results.—L. i./19,145.

Vaccines for treatment.

No. 3. Typhoid Vaccine comprises Agar cultures of the several organisms.

Dose.—50, 100, 250, 500, 1000 and 2000 millions. An initial dose of not less than 250 millions can be safely used—these to be repeated or increased under guidance of the clinical signs and symptoms. It might be of value to give a vaccine of *B. Coli* and *Streptococci* to raise the immunity against these organisms before they can take an active part in the process of destruction of the tissues (as in the later stages of typhoid).

Stock army vaccines used in 230 cases of B. Typhosus Infection. Results disappointing. In 29 there was a definite good influence, but of those 20 were 'good' cases prognostically. In the cases requiring help the physician is disappointed. Fever not shortened. Stock vaccine not recommended.—T. H. Whittington, L. i./16,759.

Intravenously 50 to 250 millions constitute a suitable dose.—Jobling and Petersen, Jl. Am. Med. Assn., June 3 and August 7/1916.

Typhoid vaccine *intravenously* has been found of great value in the treatment of typhoid fever. Large initial doses must be avoided. A febrile reaction exceeding 40·5° C. is inadvisable. The initial dose should be about 120 mill. B. typhosus, gradually increased to 200 mill. if necessary. Perforation, severe hæmorrhage, severe myocardial degeneration and severe second infection are contraindications. Mild hæmorrhage, pneumonia, mild myocardial degeneration, meningeal symptoms and severe toxæmia are indications for use of smaller doses than usual.—K. D. Fairley, per Jl. Trop. Med., Dec. 15/23,368.

Life Cycle of Bacteria.—Bacteria reproduce themselves in other ways than by simple binary fission. The life cycle in some cases includes an invisible or nearly invisible phase. Certain pathogenic bacteria are shown under certain conditions to give origin to viable and vegetative forms so minute as to come within the category of filterable viruses. Experiments with Typhoid, Paratyphoid and Dysentery Organisms. A paper with excellent microphotos.—E. C. Hort, B.M.J. i./17,571.

Earlier References.

Lincoln epidemic of 1905, no anti-typhoid inoculation was tried.—W. W. W.

Typhoid Carriers *vide* Vol. II.

Living Attenuated Vaccine containing living typhoid organisms (attenuated by heat at 50° C.) gives a higher degree of immunity than the use of dead organisms. Antityphoid vaccination is well conducted by inoculation of ½ Cc. of the usual dead vaccine (Wright) and one week after 1 Cc. of live vaccine. There is no danger, and both vaccinations may be with live cultures. —A. Castellani, Colombo.—L. ii./09,528; see also L. ii./09,1884. This live attenuated Vaccine is harmless (given subcutaneously). The strain of organisms should be non-virulent but rich in antigen as determined by animal experiments. In man the immunisation obtained by two inoculations of this or any dead vaccine is never complete—it is only partial. In countries where Paratyphoid A. and B. are endemic besides typhoid fever, Mixed Vaccine is best.—A. Castellani, L. i./13,595.

Preparation and keeping properties of Antityphoid Vaccines. The sterilisation of a Vaccine may be done by heating at 60° for twenty minutes, or at 50° for 1 hour. This kills the living culture, and the addition of 0·5% Phenol, or 0·25% Lysol preserves from possible subsequent contamination. The sterilisation with the Phenol is efficient,—heating is not desirable. Vaccine with the addition of Phenol 0·5% retains its power for two years.—L. ii./09,436.

Heating an Antityphoid Vaccine in order to sterilise it diminishes its immunising properties and curtails its keeping properties. Carbolic Acid 0·5% would appear to be the best agent with which to sterilise,—it obviates any necessity for heating.—Annus Medicus.—L. ii./09,1884.

A case of suspected pneumonia following on typhoid showed large numbers of *B. typhosus* in the sputum with absence of the pneumococcus. Consolida-

tion of both bases and a pleuritic rub were evident upon auscultation. Temperature of 105·4° F. reduced to 99° F. in 30 hours with uninterrupted recovery after dose of 50 millions of patient's own typhoid organism.—R. W. Allen, Polyclinic.

Sir D. Semple on the Vaccine Treatment of Typhoid.—The appearance of protective substances in the blood of a typhoid patient is the result of nature's effort to get the upper hand of the infection. This natural response to infection during the course of the disease corresponds to the response which takes place when a prophylactic inoculation is carried out, *viz.*, an increase in the agglutinating power of the serum, an increase in bactericidal substances and an increase of opsonins, and possibly other changes as yet uninvestigated. The use of Vaccines depends on the reaction they set up in the tissues and the consequent production of bacteriotropic substances. The local elaboration of antibodies by the subcutaneous injection of antigens in this manner is not, however, universally accepted. Semple reports on 60 cases with two deaths and two relapses. With few exceptions the temperature was lowered and there were no *sequelæ*. In one case the infection was mixed *B. Typhosus* isolate from the blood early and *B. Paratyphoid A.* from the urine and fæces when convalescence was setting in. Dosage varied from 6 to 50 millions in earlier cases and 50 to 100 millions in more recent ones. Most had from 4 to 6 doses.

Diagnosis is best by direct culture from the blood. Autogenous Vaccine can then be produced by the next day or in 48 hours. Give stock Vaccines meanwhile. Sir D. Semple, Jl. Vacc. Therap., Feb., '12.

Interspacing of doses.—Some cases did well on daily doses. Medium dosage, say 100 millions may be given to begin with gradually increased to 200 or 300 millions with interval of 24 to 48 hours between each dose.

The Vaccine treatment seems to make average cases mild, severe cases into average and only the very worst cases are not favourably affected. Clinical improvement five days after a dose of 2 millions. Fall of temperature and return of appetite. Four millions as second dose, subsequently the plan was to give half the initial dose as the second dose. Second injection made on the fourth or fifth day, *i.e.*, as soon as the improvement after the first injection began to pass off and every subsequent fourth or fifth day till convalescence is established. Reviewing 22 cases the conclusion is—if the case is severe and especially if of the cerebral type with muttering delirium, give half the ordinary initial dose, *i.e.*, 1 million for an adult. If patient not unduly ill and especially if admitted within the first fourteen days give two million.—F. J. Sadler, Q. Jl. Med., Jan., 1912.

Avignon epidemic, Antityphoid Vaccination in.—Not a single case occurred in the garrison amongst those vaccinated.—L. i./13,48.

Antityphoid Committee's Report—Strongly advises the practice of Antityphoid Inoculation in the Army on voluntary basis. Its imperative necessity.—Sir W. B. Leishman, B.M.J. ii./14,369,408; Rapid technique for Army work, *ibid*, 470,483; Technique, *ibid*, 640.

Experiments showed that Vaccines quite freshly made, *i.e.*, less than three weeks old, give rise to local and constitutional symptoms more marked than customary. Inoculations should be made some 4 to 6 hours before bedtime for the sake of rest at time of the reaction.—L. i./13,1477.

Two cases of **Paratyphoid B. Infection** treated with Vaccine prepared by cultivating from the fæcal material on Conradi Drigalski medium (*q.v.*) and killing the organisms by heating 45 minutes at 58° C. In this way Vaccine is ready in 48 hours.—W. M. Crofton, B.M.J. ii./13,1373.

Besredka was unable to produce typhoid by injection of living typhoid bacilli until he had previously given **Ox Bile.** This had the necessary effect on the mucous membrane and allowed the bacilli to pass through unaltered. —A. Latham, L. i./22,263. (*Cf.* abstracts under bronchial asthma and tuberculosis and local immunity.)

PREVENTIVE IMMUNE BODIES. By 3 consecutive inoculations with 3·55 Mgr. in total of each of both B. typhosus and B. paratyphosus, the protective effect of serum became in most cases 400 times greater than that of normal serum—even after one year it is 5 times greater. Reinoculations produce much more of the protective substances than the original inoculation. Good results from prophylactic inoculations obtained in Americam and Japanese Armies.—Bunshiro Tanabe, per Jl. Trop. Med., April 2/23,115.

Internal Administration.

In an outbreak of typhoid in the Pas-de-Calais, vaccine was given to some 1,200 individuals in pill form. The results compared with a control group, in which ordinary prophylactic inoculation was carried out subcutaneously, showed encouraging results, pointing to an increased efficiency of Besredka's oral method. (Besredka claims that rabbits could be immunised against typhoid, paratyphoid, etc., by feeding with cultures of the organisms, after a preliminary treatment with bile).—J. Pratt Johnson, L. ii./22,753.

Anti-typhoid vaccine administered *per os* gave excellent results in an outbreak among natives employed in a gold mine near Germiston (S.A.). Doses consisted of 40,000 mill. (B. typhosus) given for 2 or 3 successive days.—A. J. Orenstein and J. H. Pirie, per Jl. Trop. Med., Sept. 15/23,292.

Massive **infection** with bacillus typhosus. A soldier while working in the laboratory of the 8th Corps Area, sucked 0·5 Cc. of a heavy culture suspension of B. typhosus through the cotton plug of the pipette. He had been vaccinated a year and two months previously with triple typhoid vaccine, but was at once given a further 0·5 Cc. of the vaccine in the hope of increasing his immunity. No symptoms appeared, except slight headache and weakness on eighth day after infection. A specimen of fæces taken on the 12th day showed B. typhosus to be present, but although closely watched no further symptoms of the disease appeared after that date.—B. C. Grant, Jl. Trop. Med., July 15/22,239.

Vaccination, Vaccine, Glycerinated Calf-Lymph. Vaccinum. P. Belg., as prepared at the Veterinary College of Brussels.

"Cowpox, or rather the artificially inoculated form of the disease termed *vaccinia*, is nothing more nor less than *variola* modified by transmission through the bovine animal."—Encyclopædia Britannica, to which S. Monckton Copeman contributes the article on Vaccination. For an abstract of the monograph dealing with the objections urged to vaccine lymph, the needs for efficient vaccination, etc.—*Vide* L. ii./11,1504.

Re-Vaccination.—Papules not going on to vesiculation show positive and normal results of the lymph on patients still more or less immune through previous vaccination.

Renner's Vaccine is free from pathogenic organisms, and there is no danger in using it no matter how old it is. It has been frequently found good and active on testing it eleven months after having taken it from the animal.

Glycerinated Calf Lymph has advantages over that obtained even from healthy children (as used in the past). Vaccination at the time of infection with a small-pox may probably modify the disease, as the incubation period of vaccinia is 4 days, whereas that of variola is 12 days. Attenuation by passage of the organism through an animal of greater resistance to the disease than man is known as '**Jennerisation.**' The danger of imparting infections and other human disease is absolutely avoided, and there is but slight risk of communicating any disease peculiar to the cow. The place of insertion should be small, otherwise the reaction is too great. The amount of protection afforded seems to be greater than that afforded by humanised lymph. Glycerinated lymph is recognised as the safest lymph for vaccination, and by the VACCINATION ACTS AMENDMENT ACT, 1898, it is enacted that if a child has not been vaccinated when four months and one week old, the public vaccinator of the district shall visit the home of the child, and shall offer to vaccinate the child with Glycerinated Calf Lymph free of charge.

Germany has a law which enjoins Vaccination and Revaccination (made compulsory in 1874). Smallpox has been practically stamped out there. The total deaths for 10 years (1898 to 1908) in Germany in a population of over 62,000,000 never in one year reached 100,—the highest number was 65 in 1908. ***During the same decade in different years we had 600, 700 and 800 deaths out of a populaton of 44,000,000.*** Practically no steps in Germany are taken to provide small-pox hospitals,—in London there are hospitals with bed accommodation for 2,000 or 3,000 patients. ***25 % of the children are not vaccinated.*** When these grow up the danger of an epidemic will be increased. Futility of the conditions under which conscientious objectors' certificates of exemption can be obtained.—Dr. Hillier, from a Parliamentary Debate on Vaccination.—B.M.J. i./11,955.

Glycerinated Calf Lymph is supplied in tubes each containing sufficient for 2, 3 or 8 cases, and also in vials for 30 to 40, and 60 to 80 vaccinations. **Vaccination Lancets** of special form are convenient.

Vaccine Injectors of Rubber are prepared of different forms and **Vaccination Shields** are *sine qua non* in careful vaccination.

N.B.—Vaccine Lymph is destroyed in potency in 36 hours at 37° C. (1), *and a temperature of 57° C. destroys it in 5 minutes. Ice chests are arranged for the Govt. Lymph to maintain at 10° C. Even a temperature of −180° for a long period* (11) *weeks maintains lymph active. Kept 1 year at −5° C. was found more active than that kept at +10° C. same time.—A. Newsholme, M.O., L.G.B.*

Chloroform water has been recommended to replace Glycerin to kill off extraneous bacteria, more rapid effect. Urgent demands for vaccine as in an epidemic, could be met by this method with a supply of vaccine in 14 days, instead of the month or 6 weeks necessary for glycerination.

For the storage and use of lymph it is recommended to mix lymph 50 parts, glycerin 25 parts, and water 25 parts.—Pr. lx. 284.

A treatise, historical, bacteriological, giving the method of manufacture of calf vaccine, the glycerination of the same, the filling into tubes, and the bacteriological examination of lymph.—W. H. M., C.D. ii./01,629.

Differential diagnosis of small-pox and chicken-pox.

The chief points generally relied upon to distinguish chicken-pox from small-pox are the following :

(*a*) The distribution of the eruption, which is found most abundantly on the trunk, and more thinly on the face and hands.

(*b*) The absence of the eruption from the palms, soles and palate, especially in young children.

(*c*) The absence, or short duration, and unimportant character of the pre-eruptive stage.

(*d*) The absence of umbilication of the vesicles in the earlier stages of the eruption.

(*e*) The absence of a pre-eruptive stage.

All these characteristics, however, may fail. In many cases the distribution of the eruption, when scanty, is the same on the face and extremities as on the trunk. Sore throat, accompanied by an outbreak of papules, though usually associated with small-pox, may appear in chicken-pox. Umbilication is often not seen in small-pox at any stage of the eruption, while a slight amount may be seen in chicken-pox. A pre-eruptive stage may occur in chicken-pox similar to that in small-pox.

Other important points, pointing to diagnosis in favour of chicken-pox are the absence of lumbar pain, the presence of elliptical or oval vesicles, continued fever after appearance of eruption, and collapse of the vesicles on being punctured in one spot only.

There are, however, two really reliable signs, at present much neglected which should have preference over all others :

(*a*) The early vesiculation and crusting of the papules, which may occur in so short a period as thirty-six hours.

(*b*) The contemporaneous presence of papules, vesicles and crusts on various parts of the body.—A. T. Brand, B.M.J. ii./22,823.

Cases are missed leading to a sequel of 5, 10, 15 or more deaths, as the case may be. Remarkable difficulty in recognition. Importance of young men familiarising themselves with the subject.—W. McC. Wanklyn, B.M.J. ii./22,775,1045,1092.

The following brief notes are arranged approx. chronologically according to their appearance in the literature.

The parasite of small-pox and vaccinia, an amœboid protozoon, can be stained with Safranin and Lœffler's Blue.—B.M.J. ii./04,1410; L. ii./04,1777.

The organisms of variola, vaccinia and varicella.—L. i./05,118.

The virus of small pox and vaccinia. Description of theories of the contagium.—B.M.J. ii./06,1576.

Motile 'grains' in vast numbers are seen both in fresh variolous matter, and in the contents of a human vaccine vesicle. They are considered as spores by de Korté; they are immobile in glycerinated lymph.

Attempted culture of the specific organism of vaccinia, *e.g.* within a celloidin capsule in the peritoneal cavity of the rabbit.—B.M.J. ii./06,1780.

Cowpox, outbreak of.—L. ii./08,719.

Gout, rheumatism and allied affections have occasionally been found to improve on an inoculation with Calf Vaccine.

Small-pox epidemic in London resulting in a number of deaths. Tracing inception of the outbreak. Systematic visitation of all contacts. The infection appears to have started in a mild form, and increased in infectivity as it passed repeatedly through different hosts.—L i./11,687.

In the unvaccinated it is persons at the extremes of life, mainly children under 10 and old people who suffer most. In the previously vaccinated there were no cases at all in children under three and no deaths under 20, but as age advances the protective power diminishes.—A study at Liverpool, W. Hanna, L. i./13,1253.

Small-pox in the Far East, South and Central America and in Europe. Résumé.—L. ii./12,1813.

A concise account of Vaccination as first discovered and practised by Edward Jenner.—See a Lecture by R. T. Hewlett, P.J. i./13,398.

Variola Organism, Cultivation of, Experiments in India.—L. ii./12,20.

Leicester, a town with 230,000 inhabitants, has practically dispensed with infantile vaccination for 30 years. In spite of all the positive predictions to the contrary has dealt as successfully with small-pox as any other large industrial centre. An answer to 'Neglect of Vaccination.'—B.M.J. i./13,416.

Owing to laxity with which vaccination is now enforced an epidemic may break out at any time in the near future.—G. H. Mead, L. ii./18,206.

Half century of Small Pox and vaccination.—J. C. McVail, B.M.J. i./19. 297,339,373,408.

Modified small pox, 3 cases in Essex. It might be wise to insist on isolation of chicken pox for the first 10 days.—W. Allingham, L. i./20,1162.

ORIGIN OF VACCINATION. Benjamin Testy, a Gloucestershire farmer in 1774 inoculated his wife and family with cowpox to protect them from small-pox. He was stoned for it. In 1796 E. Jenner the inoculator of small-pox in his district, established the practice of vaccination which the whole world ultimately gripped.—C. Dukes, L. ii./21,1190.

Small-pox in Nottingham, June to August 1921, possibly by infection by contact with imported rags, clothes and the like.—B.M.J. ii./21,333.

Inoculation against small-pox in the Shetlands prior to discovery of vaccination. The bacteria were killed by peat smoke and camphor and the virus attenuated by keeping for years underground.—B.M.J. ii./21,912.

Vaccine Lymph subcutaneously as protection against small-pox. 800 patients were tried—the injection given in the arm. 82% showed focal reaction but no superficial vesiculation except where the needle had scratched the skin. These cases were classed as successful. Twelve of the cases were revaccinated in the usual way and did not 'take.' This was regarded as proof that they were protected.—Ind. Jl. Med. Res., per L. ii./21,243.

Malachite Green or Brilliant Green, as such, or deoxidised to render them colorless, used as purifiers of vaccine lymph. Proportion 1 in 10,000, this being slightly less than the amount advocated by Lœffler in his medium

for the express purpose of enabling *B. Coli* to live and flourish. 0·5% Phenol with Glycerin also added, then Sodium Hyposulphite. Further criticisms.—B.M.J. i./22,847. See also Myer Coplans, *ibid.*, 933.

Small-Pox in London. 19 cases during the period July 26th to October 13th, 1922. The outbreak originated in Stepney—a youth of 16. He infected six persons.—For fuller details see B.M.J. ii./22,819.

Small-pox, Treatment of. Solution of Izal used in 1902 instead of Potassium Permanganate. On removal from bath, patient completely bandaged in layers of Alembroth Gauze bandages. The idea was to prevent pustulation by outside organisms. Some cases were confluent, but, in general, the results satisfy.—A. Mearns Fraser, L. ii./22,1303.

Four out of every five of the population in this country are ***unprotected*** by vaccination. In a recent epidemic in Toronto, 3,000 deaths from small-pox resulted from one mistaken diagnosis of chicken-pox. Discussion of differential diagnosis of the common exanthemata.—L. i./22,531.

Outbreak of small-pox in Anguilla.—S. B. Jones, Jl. Trop. Med., Oct. 16/22,321.

Small-pox statistics since 1881.—B.M.J. ii./22,943.

Small-pox and vaccination in the Phillipines. Published statistics there unreliable.—J. S. McVail, B.M.J. i./23,158.

Small-pox in Central Africa. Small-pox vaccine in powder form deteriorates owing to climate and the long journey from base. Best results obtained by addition of Glycerin to powder.—N. Cantlie, Jl. Trop. Med., Feb. 1/23,35.

Jenner Centenary Celebrations.—An interesting address by Sir W. Hale-White.—B.M.J. i./23,204.

Account of Jenner's life and work.—L. i./23,137.

Early and remarkable spread of Jenner's teachings. Even the Chinese published his work in their own language.—L. i./23,521.

Jenner and small-pox.—Leader, Jl. Trop. Med., Feb. 1/23,46.

Varieties of small-pox.—J. C. McVail, B.M.J. ii./23,338.

Alastrim. The question of identity of this with small-pox is still unsettled Outbreaks in East Anglia and in Jamaica in 1920. The disease on the whole is of extraordinarily mild character. On recovery there is no deep pitting or scarring. The characteristic odour is absent. Proportion of severe cases among adults higher among non-vaccinated but they had not been vaccinated more recently than 20 years.—L. ii./21,1286.

The name should be **Amaas** instead of Alastrim. The disease has been known, and prevalent, among native races from time immemorial. It is easily recognised by experienced S. African medical men.—L. i./22,403,502. See also B.M.J. ii./22,65,283.

Rabbits inoculated with alastrim were almost completely immune to vaccine virus—evidence of the identity of alastrim with small-pox.—J. P. Leake and J. N. Force, per Jl. Trop. Med., June 1/23,199.

Report of outbreak in Antigua, B.W.I. The disease is undoubtedly generically the same as small-pox but is specifically different. It seems to bear the same relation to small-pox as paratyphoid to typhoid. Vaccination protects very thoroughly. Points of similarity and difference between small-pox, alastrim and chicken-pox.—E. W. R. Branch and W. R. McDonald, Jl. Trop. Med., June 15/23,215.

Blood studies in small-pox with special reference to alastrim.—Prof. W. H. Hoffmann, Jl. Trop. Med., June 15/23,217.

Whooping Cough, Vaccine of Whooping Cough Bacillus (Bordet-Gengou). For details of the Bacillus, *v. Vol. II.*

Is of service in lessening the violence of the paroxysms and shortening the duration of the attack. *Initial dose* for infants, 5 millions. The dose is to be repeated or increased every 4 or 5 days. Ampoules contain 5, 10, 25, 50, 100, 250 and 500 millions.

As *B. Influenzæ* and the Pneumococcus commonly accompany Bordet's bacillus in these attacks the combination of half the dose indicated above of the *B. Influenzæ* and of ¼ the dose indicated above

of the Pneumococcus is likely to prove beneficial. A Vaccine of this composition is supplied under the name **Compound Whooping Cough Vaccine.**

Whooping Cough Vaccine appeared of little utility.—D. Paterson and J. M. Smellie, B.M.J. i./22,713. But good as prophylactics.—J. F. Rey, *ibid.* 781.

SENSITISED VACCINES (SERO-VACCINES).

Besredka's Sensitised or sero-vaccines are vaccines which have been treated with the corresponding antisera prior to their use. They possess certain advantages over the older form of vaccine.

(1) They are incapable of causing any ill-effects and the risk of overdose is negligible; (2) they produce no local or general reaction; (3) they bring about a more speedy rise to immunity without any precedent depression. Their use therefore is especially indicated; (1) in acute infections, especially if these be systemic in nature; (2) in severely toxic conditions; (3) for immunising purposes in the presence of an epidemic, *e.g.*, of plague, cholera, typhoid fever, cerebro-spinal fever, pneumonia, influenza or scarlet fever in order to secure rapid immunity in the, as yet, uninfected.

Their use is, however, accompanied by certain disadvantages:—The rise in immunity though more speedy in onset does not attain a correspondingly high level; hence they are not so well adapted for the treatment of chronic infections; they can only be prepared when the corresponding anti-serum is obtainable; great care is necessary in their preparation to exclude all other pathogenic bacteria, for whereas a bacterium is rendered innocuous by sensitisation with the corresponding anti-serum, this latter is without action on the contamination; thus unless sterility is afterwards ensured by heat, a procedure which may not be without ill-effect upon the sensitised bacilli, the use of such a contaminated vaccine is clearly dangerous; the keeping powers of sensitised vaccines are relatively smaller; de-sensitisation is said to occur in some instances after six months.

Dose.—"Sensitised Vaccines" are used in larger doses and at shorter intervals than other vaccines. The chief signs of immunising response are: improvement in the general well-being of the patient and at the infected focus if localised; in the temperature and pulse-rate. If the initial dose result favourably in any of these directions especially with regard to the general well-being, that dose is repeated at the first signs of retrogression; if the resultant improvement be slight or retrogression speedy the next dose is of double or even quadruple strength; if no improvement result double or quadruple the initial dose is given the succeeding day. In the majority of systemic infections such as those due to the *streptococcus, staphylococcus, pneumococcus* or *B. coli* it is well to give doses of 100, 500, and 1,000 millions on successive days.

Caution.—The appearance of any local or general reaction must be taken as indicative that either the vaccine has been incompletely sensitised or that it has become partly or wholly de-sensitised since

its preparation, hence either a fresh sensitised vaccine must be employed or much care must be exercised in the rate of increase of dose. For immunising in an epidemic, *e.g.*, of Typhoid, doses of 1,000, 2,000 and 5,000 millions are to be given on successive days.

Sensitised or Sero Vaccines of the following are prepared in strengths 100, 250, 500, 1,000, and 2,000 million per ampoule.

B. Coli	**Pneumococcus**
Diplococcus Meningitidis (Cerebro-spinal fever).	**Staphylococcus** (Albus or Aureus or mixed).
Gonococcus	**Streptococcus**
B. Influenzæ	**B. Typhosus**

For their manufacture in certain instances a supply of human antisera derived from patients who have been highly immunised against the corresponding bacterium have been used, in others antisera derived from calves or horses have had to be employed for the sensitisation of the bacteria.

W. B. Alcock first used living bacteria as Vaccines, on Besredka's principle, in the treatment of human disease. Micro-organisms, after contact with the specific immune serum containing the numerous antibodies, such as agglutinins, anti-aggressins, and antitoxins, in the serum of persons or animals infected with the particular bacterium, lose some of their virulence and become more readily phagocytosed and less toxic, but this loss of toxicity and virulence does not impair their vaccinating power. Cocci can be injected into the infected animal, first dead and then, after sensitisation, in a living condition, even into the veins, without harm resulting—the antagonistic properties being called into play and thus neutralising the lethal effect of the living microbes. In mixed coccal infections the phagocytes tend to take up and destroy the non-virulen strain while the virulent cocci are left untouched.

Method of Sensitising Cocci.

A Peptone Agar Culture or Serum Agar Culture is washed in 0·8% Saline and the Cocci then brought into contact with the Specific Serum for 1 to 12 hours according to the strain. Then centrifugalise, wash and prepare a new suspension in which 2,000 million bacteria are contained in 1 Cc. Children received 1/10 to ½ Cc. and adults ½ to 3 Cc. At first sensitised heated cocci were given, later sensitised living cocci. *Dose* repeated after 7 to 10 days. —Int. Congress of Med., 1913, B.M.J. i./13,385.

Vaccination with living micro-organisms in gonorrhœa and against various strains of *Staphylococci* and *Streptococci*. Results from 150 cases—the first experiments undertaken in the application of living sensitised Vaccines to man. It was found that an animal would support more Sensitised than Non-Sensitised virulent *Staphylococci* and *Streptococci*. A non-sensitised Staphylococcus Pyogenes Vaccine tried on the writer of the paper produced an abscess and lymphangitis necessitating cessation of work. The same dose sensitised was tolerated by a patient. Orchitis and epididymitis were well treated, as also rheumatism (gonorrhœal), tendinitis, periarthritis and arthritis with exudation. Large doses were found to be the best. Sterilised *gonococci* rapidly produce or

stimulate a body reaction. In the **Staphylococcic Series** certain cases derived no benefit from dead Vaccines and were rapidly ameliorated by the living sensitised organisms. All cases treated by latter method were remarkably ameliorated. In the **Streptococcal Series**—10 patients injected with living and 5 with dead Sensitised Streptococci. Results in general with the dead organisms good, but these were surpassed by the living organisms.

Dose.—Initially 20 million Staphylococci or Streptococci or 200 million gonococci (dead) and augment according to reaction.—W. Broughton-Alcock.—L. i./13,1155.

The method of preparing sero-vaccines is based on the observation of Ehrlich and Morgenroth, that when a specific antibody is brought in contact with the corresponding protoplasmic substance, the latter fixes the specific antibody to itself to the exclusion of every other substance. If, therefore, a bacterium and its antibody are brought into contact, the two enter into a firm combination, and this may be freed from all other substances which may be present; it thus follows that if an emulsion of bacteria and the corresponding antiserum are mixed together and allowed to enter into union, the bacteria and immune bodies bound thereto may be thrown down by centrifugalisation and be separated from the serum and contained substances, which, as stated, interfere with the powers of the bacteria to incite immunity; this combination of vaccine and antibodies is known as a "sensitised" or "sero-vaccine."—R. W. Allen.

Prophylactic use of Sensitised Vaccines.—S. T. Champtaloup, B.M.J. i./14, 1221,1256.

References.

The combined use of Antiserum and Vaccine was tried by Lorenz in 1892—he endeavoured to protect pigs against swine erysipelas. Calmette and Salimbeni tried the method in plague. They found the resultant immunity was more prolonged than that given by Antiserum alone, but considerably shorter than that given by Vaccine alone, but it was found by Pfeiffer and Friedberger that the use of Serum seems to interfere with the production of active immunity due to the Vaccine. There is, when the two are given together, a rapid elaboration of toxic bodies due to their interaction and this may be detrimental to the production of immune substances by the tissues. The various antibodies cannot be elaborated to the best advantage because the tissues are overloaded with a sudden dose of toxin set free by the action of the antiserum on the Vaccine.

Vaccination for typhoid by living sensitised typhoid bacilli.—Experiments of Metchnikoff and Besredka proved that the chimpanzee could be protected against an infection following large doses of B. typhosi given by the mouth, while control animals contracted a disease which clinically appeared identical with typhoid in man. The method was to inject in two doses at 10 days' intervals an emulsion of sensitised living B. Typhosus. Experiments were conducted on man as follows:—

To a culture of 24 hours on gelose medium without Peptone 1 Cc. of sterile 0·8% Saline is added. The Emulsion is filtered through fine silk and ½ Cc. of Antityphoid Horse Serum is added. The mixture is left 24 hours at laboratory temperature (20° C.). Sufficient Saline is added and the mixture centrifugalised 5 to 6 minutes. After removing supernatant fluid more Saline is added and again centrifugalised, more fresh Saline is added to the washed bacilli and the strength finally adjusted so that 1 Cc. contains about 500 millions—the minimum adult dose. Results encouraging. There were no ill-effects whatever, no living bacilli were excreted in the urine or fæces, and the amount of local and general reaction was decidedly less than that produced by a corresponding dose of an unsensitised dead Vaccine.—W. Broughton-Alcock, L. ii./12,505.

Though anthrapoid apes cannot be immunised against typhoid by an infecting dose of dead bacilli, sensitised *living* bacteria had that power and these workers showed the method to be harmless.—Leader, L. ii./13,27.

Sensitised Typhoid Vaccine (1,000 million per Cc.), dose 1 Cc. upwards, adequate. Intervals of about 7 days between doses. Patient should rest 24 hours after a high dose.—W. Broughton-Alcock; L. ii./13,104.

By the simple process of bringing the Vaccine into contact with homologous immune serum the bacterial cells attract to themselves their specific antibodies present in the serum and combine. After sufficient time has elapsed for the absorption of antibody to take place the bacterial cells are centrifuged out, the supernatant serum is removed and replaced by saline, the deposited bacteria being freed from all traces of serum by centrifugalising provide a deposit which consists entirely of bacterial cells in combination with their specific antibodies. The use of sensitised vaccine causes no diminution in the animals' specific resistance. In 19 cases of *Streptococcus pyogenes aureus* infection there was no harmful effect. In 12 cases—at least 6 of which were extremely grave—there was improvement. Prophylactically should be of great value.—M. H. Gordon, L.i./13,1796. See also a critical review by this author, Q. Jl. Med., 1912, p. 509.

Good results with Sensitised **Gonococcus Vaccine** in gonorrhœa and its complications—in acute and chronic gonorrhœal rheumatism and arthritic affections attributable to a previous gonorrhœal infection. Living Sensitised Vaccines best.—L. Cruveilhier, L. ii./13,1311.

Besredka's Vaccine appeared to have no advantages—Antityphoid Committee Report, but there was evidence that vaccine quite freshly prepared gave rise to local and constitutional symptoms more marked than customary.—L. i./13,1477.

The lack of capacity for harm of living sensitised bacilli has been proved by numerous observations. While endeavouring to produce a sensitised vaccine of a Streptococcus from a grave pulmonary infection, experimenter was severely cut through breaking a centrifuge tube. Many millions of the bacteria must have been introduced into the tissues, and many must have entered the blood-stream; as judged by the agglutination sensitisation did not appear to be very complete, but the preparation of the sero-vaccine was hurried on, and an hour or two later he gave himself 100 millions of the Vaccine with result that only slight feverishness occurred on the following day.—R. W. Allen.

Gonococcal arthritis treated by sensitised Gonococcus vaccine. With this there is practically no pain or local reaction. Dose range from 25 million on the first day to 550 on the 30th day.—H. D. Haworth, B.M.J. i./18,4.

Gibson's Sensitised Dysentery Vaccine.

It has been thought possible to protect against infection due to the two well recognised causes of bacillary dysentery—the dysentery bacilli of Shiga and Flexner. Ordinary methods hitherto used to diminish reaction caused by vaccines of these organisms have not been found sufficiently reliable. Suggestion was made by Prof. H. R. Dean to use Eusol to neutralise toxins but Vaccines made in this manner become toxic on keeping. Sensitised Vaccines and the method of giving the Vaccine in conjunction with Antidysenteric serum also were disappointing because of defective power to stimulate the elaboration of protective substances. The late Captain H. Graeme Gibson conceived that this drawback was due to the bacteria being rendered inert as antigen by the antibacterial substances of the sera employed. To overcome the difficulty he absorbed these substances from the serum and after satisfying himself that the removal of the antibacterial substances from the serum did not interfere with its antitoxic action he gave the vaccine with this absorbed serum. Vaccines so treated led to very little reaction in man and laboratory tests showed that protective substances were formed in the blood. Protective inoculation against dysentery bacilli therefore rendered practicable.—Jl. R.A.M.C., June 1917, L.ii./17,127.

***Detoxicated** (T.M. 392346) **Vaccines.** Prepared by removing the toxins from the organisms without thereby altering their specific antigenic properties.

An organism injected alive or dead is a specific antigen stimulating the production of antibodies towards itself—the more antigen the more antibody formed but the organisms are so toxic that only very small amounts of their dead bodies (as vaccines) could be injected and therefore the amount of antibodies produced by these preventive inoculations is limited by their toxicity. *Detoxication* (removal of poison), however, *has enabled the injection of* 10 *to* 100 ***times the doses previously used.***

The cause of autolysis of the gonococcus is alkalinity. In an acid medium autolysis is prevented almost indefinitely. The organism is, that is, soluble in weak alkali but entirely insoluble in weak acids. In consequence, the detoxicated vaccine is made up in a solution of 0.5% Acid Sodium Phosphate, and 0·5% Phenol.

The *B. Influenzæ* is especially soluble in weak alkali as also to a less degree, the *meningococcus, B. Typhosus* and *B. Friedlander.*

The gram-positive organisms tested on the other hand, namely, *staphylococcus, pneumococcus, streptococcus* and diphtheroids, are comparatively insoluble. This relative insolubility is, however, not the invariable rule with gram-positive organisms.

Further work showed that organisms consist roundly of stroma (the bulk of the bacterium) and toxin. Both are soluble in alkali but the *stroma is thrown out by addition of acid* ($N/_1$ HCl) leaving the toxin in solution. The toxin can be removed by washing the precipitate with a weak acid, *e.g.*, 0·5% Acid Sodium Phosphate.

The specific antigenic characters of the gonococcus germ substance are not altered by being dissolved even in $N/_1$ NaOH.

It was found that both stroma (precipitate) and toxin are antigenic —the former the more so. Captain Thomson then came to the conclusion that no advantage therapeutically could be gained by the injection of powerful poisons like the endotoxins of this and other organisms when no antisubstance formation can be induced towards them. On the other hand antibodies such as agglutinins, bacteriolysins, precipitins and complement-deviating substances are produced against the *bodies* of germs by inoculation of the latter dead or alive as in vaccination.

The success of Typhoid inoculation is thought to be due to the relatively large bulk of this relatively large organism. (1,250 million is an appreciable quantity to the naked eye).

In short, the toxin must be removed—the dead germs minus toxin will not have lost their specific power in the process—the endotoxins have little antigenic power when injected into tissues.

A detoxicated vaccine can be safely injected into the subcutaneous tissues away from the seat of infection without increasing toxic symptoms and compel healthy tissues to manufacture specific antisubstances, while a toxic vaccine on the contrary cannot be safely injected in large quantities into a patient already suffering severely from the poisonous effects of the live organism.

Experiments proved that large amounts of antisubstances are produced by the injection of Detoxicated Vaccines.

200 million of ordinary gonococcus vaccine produced malaise and fever in the normal subject while symptoms from 5,000 million in a Detoxicated Vaccine were scarcely noticeable.

Captain Thomson then describes his work on nasal and bronchial catarrhs to which he was subject. He inoculated himself with large quantities of his ordinary *Micrococcus Catarrhalis*, and pneumo-vaccine but a *compound* Detoxicated Vaccine containing a mixture of pneumococci, M. Catarrhalis, B.

Friedlander, B. Septus, streptococci, and B. influenzæ 10,000 million per Cc. with first dose 1,500 million, second dose double and third dose also 3,000 was far more effectual and gave no inconvenience.

Large doses are essential. 1,000 million germs and upward must be given. In the case of, *e.g.*, *M. Catarrhalis*, the small doses usually given are, according to Thomson, not enough to give any very definite immunity. Ordinary mixed catarrhal vaccines are so toxic that it is dangerous to give doses greater than a total of 200 millions.

Finally, Detoxicated Vaccines can be made up either neutral or slightly alkaline or with a weak acid (0·5% Acid Sodium Phosphate with 0·5% Phenol). In the latter case *the precipitate* has to be shaken up. This is found preferable—the inoculation is made subcutaneously. Cases of gonorrhœa treated by this method have done well.—D. Thomson, L. i./19,374,1102. See also L. i./21795,849.

The problem of removing toxicity has been attacked in various ways—*e.g.*, by Besredka's Sensitisation. Editorial praise and criticism of the new work. The reliance on the complement-deviation test it is thought is the weak rather than the strong point in a remarkable chain of evidence.—L. i./19. 1123.

RESIDUAL VACCINES. Thomson's method depends on the assumption that alkaline solutions dissolve organisms plus their toxins, while mineral acids precipitate the organisms but retain the toxins in solution. H. R. Dean showed that a suspension of virulent organisms can be detoxicated by action of Eusol or weak Hydrogen Peroxide. C. E. Jenkins embodies the two methods.—B.M.J. i./21,846.

Vaccines made by dehydrating bacteria and freeing from their oily constituents by extraction with Acetone. Subsequent treatment of same with Pancreatin may be a method of freeing bacteria of poisonous substances which they liberate when undergoing digestion by ferments of the blood and tissues. —Capt. Douglas, B.M.J. ii./21,47.

RESEARCHES ON DETOXICATED VACCINES. An improvement in detoxication process. Machine for crushing germs.—D. Thomson and R. Thomson, B.M.J. i./22,796.

Diphtheria carriers treated by detoxicated vaccine. Suggested course (subcutaneously): 1st day 0·05 Cc. (=5,000 mill.), 5th day 0·1 Cc., 9th day 0·2 Cc., gradually increased to 3·5 Cc. on the 45th day.—A. R. Fraser and A. G. B. Duncan, L. ii./20,994.

***Phylacogens** (T.M. 343296, 346739) are filtered, sterilised, (72 hours) cultures of pathogenic micro-organisms and are preserved with Phenol 0·5%. The name Phylacogen is derived from Phylaxin, *i.e.*, a defensive protein found in animals that have acquired an artificial immunity to a given infectious disease. The principle is based on the theory of multiple infection. The cultures in question include those of **Pneumonia, Rheumatism, Gonorrhœa, Erysipelas,** and '**Mixed Infection.**' The latter has been advised 'in the treatment of all infections, acute or chronic, in which the condition is not due to a specific micro-organism—notably in surgical infections, abscesses, puerperal sepsis, eczema, fistulæ, etc.' The other Phylacogens are made from this as the basis by adding a filtrate of the specific culture required. Nephritis is a contraindication to their use subcutaneously. Intravenous injection is contraindicated in nephritis, in arteriosclerosis, and in cases with severe and dangerous cardiac involvement. The initial dose should always be given subcutaneously. Phylacogens are supplied in 10 Cc. vials for hypodermic or intravenous use.—Ther. Gaz., Apl., 1911.

Gonorrhœa Phylacogen.—After the injection there is a feeling of chill followed by a rise in temperature. Most patients suffer from headache after intravenous injection. Sixteen cases. The Phylacogen relieves pain, especially in gonococcal arthritis, but otherwise it does not appear to have any particular therapeutic value in gonococcal infection. The report is not very favourable. Intramuscular injections, though not advised by the makers, found to be more bearable than subcutaneous. The reaction is often distinctly unpleasant.—Major L. W. Harrison, L. ii./13,1375.

Pustulant eczema.—Mixed Phylacogen in doses from 0·5 to 8 Cc. successful.—L. i./13,1764.

Trenchant criticism of Phylacogens by H. D Rolleston.—L i./14,378.

ANIMAL ORGANOTHERAPY.

ANIMAL GLANDS AND TISSUES AND THEIR PREPARATIONS.

The word Endocrine (derivation: ἔνδον within; κρίνειν to separate), meaning 'any internal secretion,' has recently been much in vogue. In the past, it was customary to speak of 'ductless glands' and later 'glands with internal secretion.' It has been further suggested to term the secretions of these glands 'incretions.'

Entirely *en passant*, we think most students of the subject would agree with Leonard Williams (L. i./23,256), that endocrinology is still very far from being an exact science.

We think well to continue to include in this chapter a number of 'Organotherapeutic' medicamenta in addition to the glands with 'incretions.' Insulin however is dealt with under Pancreas on p. 641.

CURRENT VIEWS ON INTERNAL SECRETIONS critically examined.

Chalone (from the Greek χαλάω to make slack or relax) is used for secretions with inhibitory or relaxing actions as opposed to hormone —excitant. (Schafer, 1915).—Prof. Swale Vincent, L. ii./22,313.

GLANDS OF THE BODY DIVIDED INTO 3 GROUPS. (1) Those which discharge a secretion at that part where it has to exercise its chemical activities, *e.g.* the salivary glands. (2) Those glands which not only have an external secretion, but also have an internal one, which finds its way direct to the blood stream, *e.g.* the pancreas, which, in addition to its secretion into the intestines, is able by means of its cells to control the utilisation of sugar. (3) The ductless *glands*, *e.g.* the thyroid, parathyroid, suprarenal and pituitary. An interesting account of the development of Thyroid and other medication including George Murray's work (a Newcastle physician) who injected the juice of a sheep's thyroid in myxœdema which paved the way to its general use in treatment of cretinism and many other results of hypothyroidism.—W. Martin, P.J. i./23,232.

Animal Membranes for surgical use.

In addition to Goldbeater's Skin, the peritoneum of the ox (known as *Cargile Membrane* in America) the gastro-intestinal mesenteric attachments of the sand-shark, *Carcharias littoralis*, has been used, one of which produces 2 or 3 square feet of gossamer-texture strong material which can be kept in alcohol.

Bone Marrow, Red, Extract.

The marrow of ox and veal-bones and sheep's ribs has been used as a remedy for pernicious anæmia, chlorosis, scurvy, purpura, hæmophilia, debility, lymphadenoma and rickets.

Tablets, containing 1 grain of the desiccated marrow, equal to 20 grains of the substance in its natural state. Each weighs 3 grains. *Dose.*—1 to 3.

***Marrubin** (T.M. 261511).—*Syn.* GLYCERIN EXTRACT OF RED BONE MARROW, **Medullary Glyceride.**

Dose.—1 to 2 drachms, increased if desired.

A thick brown liquid, made by extraction of the ox-bone marrow. Employed as a substitute for cod-liver oil.

Marrubin has had beneficial effects on weak children, and is suitable for the treatment of anæmic conditions.

The following are made with *dose* 1 to 2 drachms—

Marrubin cum Pepsina, Marrubin cum Pepsina et Quinina, Marrubin cum Bismutho et Pepsina, Marrubin cum Bismutho et Ferrum. These are nutrient and digestive.

Ⓟ**Marrubin cum Bismutho et Strychnina,** containing $\frac{1}{120}$ to $\frac{1}{60}$ grain Strychnine in 1 to 2 drachms respectively. Tonic.

Also combined with **Cascara, Tinctura Laxativa, Podophyllin, Hypophosphites,** and with **Ferric Phosphate.**

ℙ1 **Marrubin cum Arsenio.** Containing in each drachm $\frac{1}{100}$ grain Arsenious Acid. In pernicious anæmia useful.—Tirard.

***Virol.** (T.M. 251002). A preparation of bone marrow, with malt, egg, and lime. Has nutrient properties for infants.

***Myelocene.** (T.M. 248326). Is an ethereal extract of bone marrow, with a small quantity (1%) of Chloretone; it has been used by inunction, and poured into the ear for deafness due to disease of the middle ear. Half a drachm of equal parts of warm alcohol 90% and glycerin may first be employed with massage.

Also used (previously liquefied by warming, after drying the surface skin) in eczema and psoriasis, and in rheumatism.

For lupus, the nodules are treated with Myelocene to remove the catarrhal processes, and then a caustic is used and the Myelocene treatment again resumed. **Myelocene Fluid** may be dropped into the ear.

Brain Extract Glycerinated. One minim equals three grains of sheep's brains.

Dose.—5 to 10 minims *per os,* or hypodermically.

Fresh Brain Extract. *Dose.*—2 to 4 drachms thrice daily.

Uses.—In various forms of insanity with every indication of advantage.—W. Maule Smith. B.M.J. ii./12,1451.

Thromboplastin. Made by chopping up and extracting fresh ox brains with equal amount of normal saline—left in refrigerator 48 hours, pressing through cheese cloth and adding to the extract thus made after diluting with ½ its quantity of salt solution 0·3% Trikresol. Effectual hæmostatic, especially for oozing surfaces. Much used in cases of hæmophllia in the States, *e.g.*, following removal of tonsils and in surgery of bones, glands and nose generally. It maintains its hæmostatic potency for many months.—A. F. Hess, L. ii./15,780.

Anaphylaxis from.—Jl. Ph. Exp. Ther., Nov. 1919.

Spinal Cord Extract.

Dose.—5 to 20 minims thrice daily by the mouth or hypodermically. 1 minim is equivalent to 1 grain of fresh spinal cord.

Spinal Cord Tablets, 2½ grains.

Brain and Spinal Cord Extracts.

These, separately or mixed together, may be tried for the relief of locomotor ataxy, chorea, epilepsy, and melancholia. **Cerebral Tablets,** 5 grains. **Myelin Tablets** contain 3 grains.

Corpus luteum—The yellow material separated from the inert substances of the ovaries, and desiccated. 1=5 of fresh substance.

Dose.—5 to 10 grains in capsules or tablets three times a day. In disordered uterine and ovarian functions, for menstrual irregularity, whether from excess, deficiency or pain; for the vomiting of pregnancy, and for nerve disturbances arising from change of life and

consequent upon the removal of the ovaries. There is close complementary relation between the thyroid and the ovaries. Administration of Corpus Luteum and thyroid gland is of value in correcting the various forms of neuroses connected with ovarian atrophy. Has also been tried in anæmia, chlorosis, and Graves' disease.

Tablets are prepared equivalent to 1 grain of Desiccated Corpus Luteum=5 grains of fresh substance given in nausea of pregnancy.

Experimental investigation of the corpus luteum in relation to toxæmias of pregnancy.-The investigation was conducted with the purpose of attacking the problem of the causation of eclampsia. A compound was isolated which produces necrosis and changes very similar. It is not present in the placenta. —R. L. Mackenzie Wallis and H. G. E. Williams, L. i./22,784.

Sterility is said to be capable of treatment by glands. Women with scanty menstruation should receive Corpus Luteum, 5 grains, gradually increased to three times this amount. When associated with excessive obesity and oligomenorrhœa or amenorrhœa they should be treated with thyroid, ½ grain thrice daily.—B. Solomons, B.M.J.E. ii./22,72. Corpus Luteum in the migraine of pregnancy always has good effect.—Luhrs, per Pres., Oct. 23,349. Two substances have been separated from Corpus Luteum called 'luteolipoid' and 'lipanin.' The former has inhibitory action on the menstrual function, the latter stimulated the growth of the genitalia and promoted menstruation. —per Pres., Oct. 23,350. Corpus Luteum preferred to Ovarian substance in vomiting of pregnancy—also recommended for melancholia, obesity and sterility.—per Pres., Oct. 23,351.

Crotalin. *Syn.* **Cobra Venom.**

Dose.—Hypodermically 1/200 gradually increased to 1/25 grain. **0·0003 to 0·0026 Gm.)**

In epilepsy 1/200 grain and then 3 to 5 similar injections at 8 day intervals, then two of 1/75 grain with 14 day intervals,—these generally suffice, if not one or more 1/50 grain dose at monthly intervals, then if symptoms not disappeared give 1/25 grain dose if necessary. Modify according to age and nature of the case.

Prepared from the venom of *Crotalus horridus* (rattle snake). The venom of the living reptile is desiccated by drying under a bell jar in the sun. Ampoules are prepared containing a glycerin and water solution with tricresol added as preservative.

Self in the "Medical World," in 1908, made the observation that people bitten by snakes remain proof against attacks of epilepsy for years.

R. H. Spangler, of Chicago, claims that epilepsy can be cured by the injections. He observed that an epileptic in Texas was cured by a bite from a rattlesnake. Crotalin appears to act on the central nervous system, the condition of the blood and metabolism of the affected persons.

Snake venom. A study of. The minimum lethal dose of cobra venom for rats is 1/10th mgr. Toxic constituents described.—Maj. R. Knowles, L. ii./21,177. Antivenene found to be unsatisfactory, *ibid.* 179.

Duodenal Membrane Liquid Extract. *Syn.* Secretin Extract (glycerinated). Strength, 1 minim=1 grain of the fresh mucous membrane of the pig. *Dose.*—5 to 20 minims. **Tablets** represent 5 grains.

In diabetes, by stimulating the secretion of the pancreas—with resulting increase in the oxidation process going on in the body.

Elixir Duodenalis. *Dose.*—½ ounce once or twice daily after a meal.

Duodenal Membrane Desiccated. Clean the upper portion of the duodenum of the pig. Scrape off the mucous membrane and scale on glass by drying between 70 and 80° C. Mix three of this with 1 of Calcium Phosphate and pass through No. 60 sieve. The temperature does not destroy activity of the Secretin.

Secretin can be extracted from the duodenal membrane with 0·4% Hydrochloric Acid; nearly neutralise whilst boiling to precipitate proteins, when the Secretin will be left in the filtrate. It is by no means permanent.

Secretin is soluble in water and alcohol.—Bambridge and Menzies, 'Essentials of Physiology,' 1920.

Uses.—Secretin is indicated in all pancreatic insufficiencies, where true organic change has not occurred.

It is employed to advantage in aiding protein digestion; an important factor in raising low urea output to normal; indicated in gastro-enterostomy and jejunostomy; of distinct value in nephritis of intestinal origin; increases peristalsis and is indicated in all cases of stasis.—Beveridge, per Pres., Oct. 23,344.

See also Vol. II. (Organotherapy).

***Secretogen Elixir.** (T.M. 365397.) *Dose.*—1 to 2 drachms (**4 to 8 Cc.**).

A proprietary preparation of Secretin intended to replace Pepsin and Acid mixtures as indigestion remedy. It is stated to contain pyloric prosecretin (with 1/20% of Hydrochloric Acid to change it to secretin) and duodenal secretin. Secretogen Tablets (5 grains) containing the duodenal and pancreatic secretins are suggested particularly in faulty digestion of starch, with fermentation and flatulence.—L. i./13,44.

Eye.—**A Retinal Extract** has been tried in cases of atrophy of the retina and tobacco amaurosis. Is prepared of strength 1 ounce =4 ox retinæ. *Dose.*—2 drachms.

In a case of rectrobulbar neuritis this preparation was remarkably successful. The eye which could not perceive an electric lamp a foot off could, after treatment, see 6/9, and the result seemed to be permanent. Improvement was marked one week after the treatment. Previous treatment for 2 months had been of no avail.—S. Percival, Newcastle-on-Tyne, March, 1915.

Hirudines (*Off.*). **Leeches.** *Hirudo Medicinalis and H. quinquestriatia*—the latter, the five striped Australian leech is now also (*Off.*).

(*To remove leeches lodged in the throat, e.g.*, from drinking water containing *Limnatis Nilotica.* Paint the leech with strong cocaine solution (15 or 20%) and remove with forceps or let it be coughed up, patient lying with head hanging. Menthol in Paroleine also suggested).

Hirudin. *Syn.*—**Leech Extract.**

An active principle from leeches, made by macerating the chopped-up heads in Normal Saline at 40° C. *Dose*, intravenously, 0·02 to 0·3 Gm. in 50 Cc. Normal Saline. Solutions must be freshly prepared. Has been used in treatment of puerperal eclampsia—theory in last Edn., p. 914.

For EXPERIMENTAL PURPOSES Hirudin has the property of maintaining blood in a fluid condition,—1 mgr. may be dissolved in 0·25 Cc. Normal Saline for the purpose,—this quantity will prevent 7·5 Cc. blood from coagulating without otherwise altering its composition.

Kidney Extract.—Kidney substance has been given in nephritis and other kidney troubles, but the evidence of its value is conflicting. —Pres., Oct. 23,371. Numerous other refs. on the same subject in our last Edn.

After repeated injections of kidney juice an active poison, heteronephrotoxin, is formed in the serum of immunized rabbits; this serum injected into rabbits proved very toxic.—per Pres., Oct. 23,371.

Liver.

Early cases of cirrhosis have been well treated with glycerinated liver extract. *Dose.*—20 Cc. daily.

Functions of liver and metabolism of fats. The liver is, *inter alia*, evidently the seat of the synthesis of fatty acids. Arachidic Acid has been found to a considerable extent in pig's liver. This acid may be a product of the synthetic activity in question.—L. i./09,593.

Desiccated Liver.—1=8 of fresh substance. *Dose.*—5 grains increased up to two or three drachms.

It increases diuresis, thus mitigating toxæmia by removing accumulated toxins.

Lymphatic Glands. **Tablets** 5 grains each. *Dose.*—1 thrice daily.

Have been used in enlarged tonsils and adenoids. The method consists in supplying lymphoid tissue artificially.

Snoring and noises in breathing disappeared and tonsils diminished in size. Thyroid enlargement in certain cases, *e.g.*, at puberty in girls submitted to thyroid gland treatment. Adenoids and enlarged tonsils are thought to be an attempt on the part of nature to augment the lymphoid tissue of the body.—H. T. Ashby, B.M.J. i./13,1159.

Glandulen, from the bronchial glands of sheep in 4 grain tablets; has been tried in phthisis.

Mesenteric Gland, Desiccated.

Tablets, 5 grains (0·3 Gm.). In scleroderma satisfactory.—Münch. Med. Woch., Jan. 7, 1913.

Mucin. *Dose.*—5 to 10 grains (**0·3 to 0·6 Gm.**).

This is the essential constituent of the secretions of mucous membranes, buccal, nasal, pharyngeal, &c. It is precipitated from these by alcohol and by acetic acid. The saliva produced by the submaxillary and sublingual glands contains it, but not the parotid. It may be procured from areolar or connective tissue, and from bile.

Taken internally, *e.g.*, **Tablets,** containing Mucin 5 grains with Sodium Bicarbonate 5 grains, relieves painful digestion, gastritis and gastric ulcer. In the form of **Nebula** containing Mucin 5 grains, Sodium Bicarbonate 5 grains, Menthol 1 grain, Lime Water ½ ounce, Distilled Water ½ ounce, has been found of value in dry catarrhs, rhinitis, &c., pharyngitis, and where incrustation on the laryngeal lining.

✱**Elixoid** (T.M. 26237 and 251718) **Mucin.** *Dose.*—1 to 4 drachms before and after each meal. As much as 3 ounces a day were given and were found soothing and moistening to the tongue and throat. As an adjuvant to thyroidectomy in the treatment of cancer. (Mucin is deficient in the carcinomatous subject). Several cases cited showing improvement in malignant growth after thyroidectomy or partial removal of the thyroid glands.

Ovaries. **Tablets,** 5 grains.

Following the example of Spermin obtained from the testes, some experiments have been made with the ovaries. An extract has failed in the treatment of osteomalacia but has proved of value in dysmenorrhœa and menorrhagia, and for climacteric ailments. Chlorosis, mental disease and hæmophilia have been treated.

The name ✱ **'Varium'** (T.M. 260858) is given to a trade brand of Ovarian Extract.

Endocrine glands, especially mammary, ovarian and orchitic, in neurasthenia in women—*entirely failed.*—E. Farquhar Buzzard, B.M.J. ii./21,703.

Endocrine factor in producing immunity and susceptibility of the teeth to **Caries.** The Calcium utilising power of the body is influenced by secretion of these glands. If enamel forms a complete covering for the teeth caries cannot occur. The teeth of a rabbit fed on Ovarian Extract had thinner enamel than that of one fed on normal diet, while the teeth of a rabbit fed on a mixture of gland extracts were larger and the enamel more dense.—F. W. Broderick, L. ii./21,1216. See also *Parathyroid.*

Ovarian gland (*whole gland*) useful in natural menopause, surgical menopause, and the late establishment of menstruation, in relieving the nervous and mental disturbances. Ovarian residue (*after extraction of corpora lutea*) appears useful in late development of puberty, infantilism, irregular menstrua-

tion at puberty, menorrhagia, obesity and amenorrhœa. Best given intravenously.—B.M.J.E. ii./21,80.

Osteomalacia treated with Ovarian substance.—G. Gentili, per Pres., Oct. 23,348.

Ovarian treatment unsatisfactory in amenorrhœa, but of value in dysmenorrhœa and menopausal troubles.—per Pres., Oct. 23,351.

The female reproductive organs—review of recent literature.—Pres. May '24,223-6.

***Ovamammoid (T.M. 346373) Compound Capsules.**

Dose.—1 thrice daily ½ hour before meals and one at bedtime.

Contain Ovarian Extract 1 grain, Mammary Gland Extract 1 grain, Lactose 3 grains.

Used in neurasthenia, hysteria, insomnia, chlorosis, amenorrhœa and dysmenorrhœa. Stated to be a galactagogue and emmenagogue.

Parotid Gland.

The parotid has been included by some among the endocrine glands and is thought to bear some relation to the thyroid.

Good results reported in ovarian disease from administration of the extract.—per Pres., Oct. 23,372.

Pineal Body. *Syn.*, CONARIUM. A small reddish grey vascular body situated behind the third ventricle which is embraced by its two peduncles.

The dissection of the head of a tuatara (*sphenodan punctatus*) led to the discovery of the origin of this body in vertebrates. The reptile in question has three eyes,—the third in the centre of the forehead only hidden by a thin membrane of skin, forms the fore end of the pineal gland. This central eye is not strictly a third eye in process of development, but the first and single eye in process of being *discarded* by gradual degeneration.—Sir A. P. Douglas, Vet. Record, *per* P.J. i./13,151.

The functions of the pineal gland are little known. Extracts of it when administered act as diuretic and galactogogue. There appears to be some antagonism between the pineal and pituitary bodies as removal of the testicles produces atrophy of the former and hypertrophy of the latter. The pineal body may have some influence on metabolism which continues through life.—L. J. Kidd, Rev. Neurology and Psychiatry, Jan., 1913, per Pres. See also L. i./14,401.

Experimental extirpation does not affect health of living animals.—Jl. American Med. Ass., 1916, 67, 1836.

Krabbe's researches show that the pineal body is neither a rudimentary nor a functionless organ, but that its histological structure bears evidence of activity. He says, however, that there is no evidence that its secretion plays a part in the development of puberty.—per Pres., Oct. 23,367.

Molina concludes that it has an effect upon nutrition and growth, upon sexual development and upon intelligence and that it has some connection with accumulations of fat in the subcutaneous tissues.—per Pres., Oct. 23,367.

Treatment by Pineal substance very much 'a shot in the dark.'—Pres., Oct. 23,368.

Preparations of the pineal body found to afford aid in cases where difficulty is encountered in increasing flesh and where lack of results from other measures compels reduction of diet.—Von Noorden, per Pres,. Oct. 23,368.

A child of 19 months, unable to move its limbs or recognise its parents, was able to walk and was otherwise rendered normal after 3 months treatment with pineal substance.—per Pres., Oct. 23,368.

Pituitary Gland. *Syn.* **Hypophysis Cerebri.**

A small reddish grey vascular body, a ductless gland, weighing about 10 grains, situate at the base of the brain. The average total weight of the Gland in the ox is 2·5 Gm. ; anterior part being 2 Gm. and posterior 0·5 Gm. It is said that 8,000 head of cattle are required to produce 1 lb. of dried posterior gland—one would have expected nearly twice the amount—arguing on a 20% dried substance yield.

Anatomically, the gland consists of three parts,—the anterior lobe, the *pars intermedia,* and the posterior lobe. The anterior lobe **(Hypophysis)** is the larger, and is made up of cubical or polygonal epithelial cells,—in structure it is rather like the fœtal thyroid, Disease of this portion is associated with acromegaly. The *pars intermedia* lies between the anterior and posterior lobes and is developed in connexion with the anterior lobe. The posterior lobe is connected with the floor of the third ventricle, from which it is developed by the neck or infundibulum=a funnel. In man both neck and body are solid with traces of a cavity in the neck.

Physiologically.—In the earlier days the function of the gland was thought to be secretion of nasal mucus, hence the name (*pituita* = mucus or phlegm). Removal of the entire gland leads to depression, muscular weakness, dyspnœa, emaciation and death. Removal of the anterior lobe leads to genital infantilism. (*cf.* however J. A. Walton—*infra*). *Insufficiency* of the pituitary gland is associated with weakness, wasting, etc. *Excessive secretion* is followed by high arterial tension, polyuria, glycosuria and acromegaly.—L. ii./10,1828.

The internally secreting glands (thyroid, parathyroid, suprarenal, pituitary) have no other function so far as is known than of producing chemical substances of the nature of **Hormones** (*q.v., Vol. II.*) —influencing other organs to which they are conveyed by the blood. It is interesting to note they are all small in structure yet they are essential to the maintenance of life.—Sir E. Sharpey Schafer, B.M.J. ii./12,597. See also H. Cushing, B.M.J. ii./12,1409.

The posterior part of the pituitary body (composed partly of nerve fibres and cells) exercises a powerful influence over the vasomotor nervous system and the regulation of blood pressure, especially in the brain ; while the anterior or glandular part influences the development of the form and size of the body and the growth of the bones. —Prof. Bert. Fischer, B.M.J. ii./11,338.

The Hormones supplied by the posterior lobe including the *pars intermedia,* regulate the tone and contractability of plain muscular tissue generally and of the heart, and stimulate the activity of the mammary gland and of the kidney.—L. ii./13,202 ; see also G. A. Gibson, B.M.J. ii./12,163.

Histology indicates that the *anterior* portion is the active part, the posterior being merely a *vestigial* structure, but *physiologically* the opposite is the case—an extract of the whole gland may be used therapeutically, but the posterior lobe is of greater importance and value, as described later. Pituitary Extracts promote excretion of Nitrogen, Calcium and Phosphorus, but further information is necessary, as dried extracts appear to operate differently to fresh preparations.

Neutral or slightly acid aqueous extracts can be boiled—at least for a short time—and the coagulated protein removed with little or no loss of activity —as shown by the work of Sir E. Sharpey Schafer and G. Oliver, in 1895. *Cf.* **Preparation of Pituitary Extract** *infra.*

Hydrogen Peroxide destroys the pressor substance, but reducing agents, *e.g.*, Hydrochloric Acid and Zinc have no effect.—A. C. Crawford and Z. Ostenberg, Chemistry of Pituitary Pressor Compounds.—Am. J Ph., July, 1914.

Pituitary Body. Blair Bell's Monograph reviewed.—B.M.J. ii./19,381.

Histamine.—Presence of, in the hypophysis cerebri. It plays an important role as stimulant for the gastric and intestinal musculature and as a dilator of capillaries during digestion. We daily consume no inconsiderable amount of it.—J. J. Abel and S. Kubota, Jl. Pharm. and Exp. Therap., June, 1919, and Nov., 1919.

D. Cow disputes the conclusion of Abel and Kubota that histamine is the plain muscle stimulating and depressor constituent of the posterior lobe of the pituitary gland, and states that the physiological and chemical evidence of the identity of the two principles do not coincide at every point.

He finds that the uterus of the mouse affords an example of a tract of plain muscle which reacts in one way to histamine and in a diametrically opposed way to pituitary extracts, and his results do not appear to bear out the hypothesis of the authorities mentioned.—Jl. Pharmacol. and Exp. Therap., Nov. '19, p. 273. See also Dudley *ibid*, 295.

DISPITUITARISM, OBESITY AND INFANTILISM. An account of the functions of the pituitary gland, also a résumé of treatment with gland preparations. —L. Tidy, L. ii./22,597.

Ovarian conditions determine the liberation of Pituitrin in Nature's laboratory. The ovarian drug is set free in the circulation; it causes the liberation of Pituitrin and the uterus is affected.—Prof. W. G. Dixon, B.M.J. ii./22,410.

Berman suggests that the posterior portion of the pituitary gland is responsible for the differentiation of sexual types. The failure of the posterior portion of this gland therefore makes hermaphroditism. In either sex specific sexual characteristics are less differentiated. Of the anterior portion of the gland, it is more or less established that failure in the male, is an essential condition, if not the sole cause of Frölich's syndrome. The psychic correlative of well developed masculinity is power, and some element of power in character make-up is undoubtedly attributable to the pituitary factor. Imagination is another psychic factor that we have good grounds for associating with the pituitary factor. In short, a rough classification of important hormones would be:—***thyroid for creation; pituitary for subjective power and adrenal for objective power.***—H. Crichton Miller, B.M.J. ii./22 552.

Surgery of the Pituitary Gland. The anterior and posterior parts appear to have entirely different functions. In two cases in which the gland was completely extirpated, the pituitary fossa at the operation being left absolutely bare, both cases survived and made good progress (*cf.* Cushing's opinion). The function of the gland, therefore, can be almost wholly undertaken by other glands in the body.

The anterior lobe controls metabolism and growth of the skeleton, including bones, cartilage and connective tissue. Should oversecretion be delayed until adult life, there will be an irregular overgrowth of bone and connective tissue, giving rise to acromegaly. In addition to these effects, it is probable that the overgrowth of the gland is associated with changes in the sexual glands, for most cases of acromegaly are clearly asexual. So far, no demonstrable changes have been seen to follow the administration of extracts of the anterior lobe, though Goetsch maintained an increase of growth and early sexual development when given to young animals.

Pars Intermedia. It is held by many that all the effects described as due to changes in the posterior lobe are really due to changes in the pars intermedia.

Posterior Lobe. The effects of administering extracts of this portion are well known. (1) Pressor effect. (2) Depressor effect. There has been observed by many not a rise but a fall in blood pressure. Schafer and Vincent noticed this fall followed second and subsequent doses if they were given soon after the first. Uncertainty as to the relationships between the pressor and depressor effects has made the use of this drug in the treatment of surgical shock not entirely free from danger.

(3) Diuretic effect. (4) Galactagogue effect.—The increased flow of milk in lactating women is only of short duration; the daily flow is not increased. It is increased excretion rather than increased flow (Blair Bell).

(5) Stimulative effect on unstriped muscle. There is no effect on *resting* uterine muscle. Powerful effect has been found in the case of the

intestinal muscles, and the drug is largely used in many forms of ileus. A similar effect is seen on the muscular wall of the bladder.

(6) Effect on carbohydrate tolerance. Many diseases of the pituitary gland are associated with distinct and definite change in the patient's tolerance to Carbohydrate, so not infrequently there is glycosuria, *e.g.* in acromegaly. The paper contains a good account of acromegaly and surgery of the pituitary gland.—J. A. Walton, B.M.J. ii./22,835.

Pituitary 'extract' is secreted into the cerebro-spinal fluid (Cushing, confirmed by Dixon). The only substance increasing the action of Pituitary in cerebro-spinal fluid was ovarian extract.—B.M.J. i./23,106.

Dried Pituitary Preparations.

Of these, there are three, made respectively from the **Entire Glands**, the **Anterior Lobe** and the **Posterior Lobe** :—

(i.). **Pituitary Body, Dried (Entire Gland)** of the ox.

Dose.—1 to 3 grains (**0·06 to 0·2 Gm.**) thrice daily.

Five parts of fresh gland yield about 1 of dried gland.

TABLETS of this entire dried pituitary gland contain 0·06 Gm. (1 grain).

Uses.—Has been employed to improve metabolism, to raise arterial tension, to increase diuretic action and to improve appetite. Given in menstrual disorders and in exophthalmic goitre.

(ii.). **Pituitary Substance Dried (Anterior Lobe** *only*).

Dose.—1 to 4 grains (**0·06 to 0·25 Gm.**). 4·5 parts of the fresh substance yield about 1 part of dried substance.

Uses.—Has been thought to exercise a stimulating action upon growth. Experiments on animals have indicated increased development of the reproductive organs (Cushing).

Has been given in certain types of obesity, also in later stages of acromegaly but not earlier stages ; also in bronchial asthma.

Thyroid and anterior pituitary deficiency generally exist together. The dull adenoid type of child often improves on combined treatment.—T. Bodley Scott and F. W. Broderick, Pr., Oct. 1921, p. 278.

(iii.) **Pituitary Substance Dried (Posterior Lobe** *only*).

Dose.— **1 to 4 grains (0·06 to 0·25 Gm.).** Made as above using the posterior lobe only. 4·5 parts of the fresh substance yield about 1 of dried substance.

Uses.—Has been used in exophthalmic goitre, acromegaly and by its action on the circulatory system, to relieve cardiac dilatation. Employed in intestinal paresis, diabetes insipidus, amenorrhœa and enuresis.

For further details see Pituitary Extract—the liquid equivalent.

Liquid Pituitary Preparations :

(i.) **Pituitary Extract Liquid of *Entire* Gland *"Special."***

Dose.—½ to 1 Cc. intramuscularly into the buttock. **Sterules** ½ and 1 Cc. are prepared.

Strength 1=1 of fresh ***entire*** gland.

Use.—This has been tried in certain types of acromegaly attributable to disease of the pituitary. It is advised to start with ½ Cc. daily and watch the case.

(ii.) **Pituitary Extract Liquid (Anterior Lobe).**

"Sterules," Hypodermic, of this preparation, 1 Cc. and 2 Cc. (in each instance) are made of 20% and 40% strength of fresh gland.

They have been given tentatively in retarded growth in children with some evidence of benefit, but it is generally considered that the anterior lobe yields no activity to aqueous media so far as can be detected.—*Cf.* F. W. Gamble, Chairman's Address, B.P. Conf., 1923.

Antuitrin A preparation of the anterior lobe of the pituitary for use in diseases of metabolism, delayed development and derangement of the genito-urinary system. Dose hypodermically 0·5 to 1 Cc.—L. i./22,22.

Tethelin.

Dose (suggested) 0·1 to 0·2 Gm. repeated at intervals of from 24 to 48 hours either locally or subcutaneously. The first dose may be applied locally as a dressing to wounds and simultaneously subcutaneously in an average case.

This body is stated to be the active, growth-controlling principle of the *anterior* lobe of the pituitary body. It is unstable and of obscure composition. It differs in its physiological effect from the extracts and active principles of the posterior lobe (infundibulum). It has no appreciable action on blood pressure or the flow of urine. It has a stimulating and regulating influence on growth not only normal but in those forms involved in the replacement of tissue lost through inanition or fevers and in the repair of wounds. In use it causes a marked leucocytosis (especially polymorphonuclears).

Solubility, about 1 in 20 in water. The solution may not be heated.

Contraindicated in malignant disease.—T. Brailsford Robertson, Jl. Biol. Chem. Vol. 24, 1916, p. 397 and 409; Jl. Am. Med. Assn., Vol. 66, 1916, p. 1009. *See* also B.M.J. ii./17,430.

(iii.) **Pituitary Extract Liquid.** (*Infundibular—i.e.*, from the posterior lobe). *Syn.* **Pituitary Liquid, Extractum Hypophysis Cerebri Liquidum, Liquor Hypophysis, U.S.** *Dose.*—½ to 1 Cc. of 20 % Extract representing 0·1 to 0·2 Gm. of Fresh Infundibulum, *intramuscularly* to secure prompt action and to avoid superficial sloughing from local vasoconstriction. May be repeated at 1 hour intervals.

A sterile solution containing the active principle of the posterior lobe of the gland of the ox in normal saline.

Sterules of Pituitary Extract—½ and 1 Cc. are prepared.

***Infundin.** (T.M. 349379), ***Pitibulin** (T.M. 384472), **Pituitarin, *Pituglandol** (T.M. 417464) and **Pituitrin** are solutions of the Infundibular Extract.

Active Principles of the Gland. A specific active principle has not been isolated. One worker has isolated eight substances from the infundibular portion only 4 of which are active and these four collectively are called **Hypophysin.**—G. B. Roth, Bull. No. 100 Hyg. Lab. U.S. Public Health Service—see Abst. P.J., i./15,410.

A substance to which the name *Hypophysin (T.M. 321726) was given was claimed to be the active Hormone of the gland. Patented process of making by precipitating a Sulphuric Acid extractive of the glands with Phosphotungstic Acid and decomposing it again with bartya. The 1 in 1,000 solutions of the salts so obtained, termed Hypophysin, is stated to be equivalent in activity to a similar solution of Pituitrin.—P.J. 1./13,514,563.—D.M.W. 39, 491; Y.B.P., 1913,21. *See also* **Tethelin**

Preparation of Pituitary Extract. Mince finely the posterior lobes of the fresh glands and extract with acidulated water. Heat the liquid to boiling for 10 minutes to remove coagulable protein and filter. Finally sterilise and keep in sealed ampoules.

In the manufacture of Liquid Pituitary preparations for Injection the important point to realise is that they will not tolerate heat either in alkaline or neutral condition.

Infundibular Extract stands boiling for ½ hour without any appreciable loss of activity, but samples of the same make, stored in India for some months,

showed appreciable loss. These preparations should be stored at a temperature not exceeding 80° F.—Capt. G. Tate, B.P.C., 1921.

Recognition.—Pituitary liquid gives the biuret reaction. Alkaloidal precipitants such as Phospho-molybdic Acid, Phospho-tungstic Acid, Bromine Water, etc., all give faint but distinct precipitates of the active principle.

Assay.—U.S. IX. assays by determining effect on the uterus of the guinea pig. β-imino-azolyl-ethylamine Hydrochloride (*cf.* p. 418 and Vol. II.) suggested as standard. It produces contraction of the uterus in as high a dilution as 1 in 250,000,000. See Am. Jl. Ph., March, 1915, and P.J. i./15,410.

Various methods of Standardisation of Pituitary reviewed. Dale and Laidlaw used a 10 to 20% decoction of fresh moist infundibular substance—this of course may vary. Potassium Chloride used.—G. Tate, P.J. i./21,268. Potassium Chloride is not sensitive.—B.M.J. ii./22,1087.

The Medical Research Council in a report (1922) drew attention to the difference in strength of liquid extracts of pituitary gland as made by various firms. —*cf.* L. i./15,764. An examination by using the isolated uterus of the guinea-pig. The living animal was not used. A strip of the uterine muscle of selected female guinea-pigs, in a state of sexual rest, is immersed in Ringer's solution to which doses of extracts are added and the reaction is communicated to the recording drum by means of a lever. The Histamine method in U.S.P. was not very satisfactory.

There is apparently no seasonal variation of ox pituitaries. One commercial sample of Liquid Extract out of eight was hopelessly bad.

Standardisation. A 2·5% aqueous extract of fresh Ox Pituitary posterior lobe is used in the Biological Standards recommended by the M.R.C. It is prepared by cutting up the material, extracting with cold water, raising rapidly to boiling and filtering. Commercially, a preparation should have 60% of the activity of the standard extract. ***A 10% preparation as in the U.S.P. is advised for the B.P.***—B.M.J. ii./22,1087.

INJECTIONS INTO FROGS of minute portions of posterior lobe induce profound darkening of the skin, and complete expansion of the melanophors. *The reaction is so sensitive that its use is suggested as a quick and simple method for the detection or estimation of the potency of such extracts.* The extract from the pituitary gland of a single frog suffices to darken at least 50 other pale individuals, while injection of 1/2,000 of a small clinical dose regularly induces darkening in a pale frog.—L. T. Hogben and F. R. Winton, per Pres., May '24,209.

Report on Physiological Examination :—

A well known Professor of Physiology in London was kind enough to report (December, 1917) on a sample of **Pituitary Extract made in our laboratories** in June of the same year :—

(1) Arterial Blood Pressure. (Experiment on Cat).

The rise of blood pressure was very pronounced and lasted a considerable time. In his experience he had never seen a better rise with other preparations. One cannot compare subsequent injections of the same or other preparations by a second injection on the same animal, as a second injection produces only a fall of pressure, due to the presence of a depressor principle in the extract.

(2) Kidney Volume. (Experiment on Cat).

This was markedly increased. The result was as good if not better than obtained with other preparations. The effect was indeed visible to the naked eye without instrumental operation.

(3) Flow of Urine. Diuresis. (Experiment on Cat.).

The effect was most pronounced and occurred whether the vagi were cut or not.

(4) Action on Uterus.

A guinea pig, weight 530 Gm. was employed and Dale's Apparatus used with 250 Cc. of oxygenated Locke's Solution.

Results with 0·1 Cc. of following preparations in the 250 Cc. of solution = 1 in 2500.

a. A specimen made in the Professor's own Laboratory .. .. Rise of recording lever = 9·5 cm.
b. Commercial sample (another maker) .. .. ,, ,, ,, ,, = 9·5 ,,
c. Martindale's .. .. ,, ,, ,, ,, = 5·5 ,,
d. Another Commercial sample .. .. ,, ,, ,, = 4·5 ,,

Using a dilution of 1 in 250, maximal effects were obtained with a, b and c, but only half the maximum was obtained with d. This method of standardising Pituitary Extracts has been criticised and it is doubtful whether the so-called active principle is not a mixture of several—one acting on blood pressure, another on the kidney and so forth.

(5) **Milk Flow.**

This was not tried being unable to obtain a lactating animal, but as the effect on the mammary gland is mainly if not entirely on plain muscle one may take it for granted, if (1) and (4) are positive (as was the case) that the effect on milk flow would be positive.

With regard to the **keeping quality,** the 1917 preparation was re-examined November, 1919—*i.e.*, 2½ years after it had been prepared. It had approximately half its efficiency on the guinea pig uterus. The effects on blood pressure, kidney, etc., were not tried

This report prompted us to experiment still further in order to produce a preparation which would show a more favourable comparison in its action on the uterus, and in July, 1919, we adopted a ***new process of manufacture***, with the following result:—

The same authority in November, 1919, reported on a **further series** of experiments. The preparations examined and compared on this occasion were:—

a. Specimen made in the Professor's own laboratory.

b. Commercial sample purchased in the ordinary routine marked 'to be used before December, 1920.'

c. Martindale's prepared by the new process July, 1919.

He states this new preparation of ours was so extraordinarily active on the guinea pig uterus "that we were obliged to dilute down to 1 part in 240,000 to obtain measurable tracings. Anything stronger (1 in 120,000 and upwards) gave a maximum effect and carried the recording lever straight off the drum."

This preparation gave more than twice the effect of the 1917 preparation (reported on above and examined in 1917).

The 1919 preparation was about equal to (a.) in this new series and in one experiment rather *better*.

It was furthermore at least twice as powerful as (b.) in this series. Martindale's preparation produced the effect promptly while with (b.) the effect was produced only after a long delay and the final effect was only about half that obtained with Martindale's as stated.

Uses.—Pituitary Extract causes uterine contraction and has a special action on uterine muscle. It stimulates unstriped muscle especially affecting also the arteries, spleen and intestinal muscles. Should not be injected during the first stages of labour, because if the os uteri is not fully open the energetic contractions may cause a rupture of the uterus. It keeps blood pressure raised for hours; but in no way supersedes or takes the place of Saline infusions. It is useful in shock and has control over post partum and other uterine hæmorrhage. It may improve appetite and capacity for sleep.

Contra-indications may be heart disease, arterioscleriosis and kidney disease. In arterial disease of the aged sudden increase of blood pressure by pituitrin might cause apoplexy.—L. i./15,289. See also M.P.C., Jan. 7/20.

N.B.—The Extract produces arterial degeneration if administered too long—it is a remedy for emergency, not routine use.

It is stated to quieten and strengthen heart beat and to increase flow of urine; acts similarly to Digitalis and Strophanthus.

When a second or subsequent dose is wanted the fresh dose will not produce more than a small fraction of its effect unless some time has elapsed.

It is suggested that such preparations may, by action upon the circulatory system, be of value in endocarditis, cardiac dilatation, ar-

teriosclerosis, cerebral anæmia and shock, may favour compensation and lessen tachycardia. Exophthalmic goitre has benefitted. Effect on the kidneys points to use in suppression of urine. May control hæmorrhage, *e.g.*, in typhoid fever. Its effect upon metabolism has led to its use in acromegaly and skin affections. *See also the following abstracts for further recent uses.*

Daily dose should not exceed the equivalent of ½ a fresh gland of the ox. Arterial pressure to be observed and taken as guide to modify dose if necessary. Should not be given when pressure is high nor combined with Suprarenal Extract.—L. i./10,381 ; see also B.M.J. i./10,350.

Acromegaly. Some good appears to come from its use in fair proportion of cases.—Guthrie Rankin.—L. i./09,28.

F. Golla was the first to use Pituitary Extract. Subcutaneous injection of the Extract in a case of advanced Addison's disease produced marked rise of blood pressure and diuresis,—the latter lasting 24 hours. The activity of the preparation is not impaired by boiling. Action in producing contraction of the uterus is said to last longer than that of Ergot. It should not be used until after completion of the third stage of labour, excepting possibly in certain cases of placenta praevia. Results in 70 cases. Useful in treatment of hæmorrhage, intestinal paresis and shock.—L. ii./10,1828.

Addison's Disease: Two cases benefited.—O. Leyton, B.M.J. i./15,245.

Pituitary body and optic chiasma lesion with acromegaly benefited by Pituitary and Thyroid Extracts. Special Extract of the anterior pituitary lobe alone—used with some sign of benefit.—L. i./11,303.

The action of Pituitary Extract and Adrenalin on peripheral arteries. Employing the method of O. B. Meyer, adrenalin constricted the peripheral arteries with the exception of the intravisceral portion of the pulmonary, the coronary, and cerebral arteries. The coronary and cerebral vessels were dilated, and the intravisceral portion of the pulmonary was unaffected. Pituitrin produced dilation of the splenic, hepatic, and gastric arteries except along the first 3 or 4 mm. after their origin from the cœliac axis, in which part constriction was produced.—D. V. Cow, Na., March 16/11, p. 101, ***see*** also L. i./11,939.

In *labour.* Useful in full-time pregnancies as a means of inducing strong labour pains, especially where pains have already set in, but have become weak or ceased.—B.M.J. i./14,906,1046; B.M.J. ii./16,781—½ Cc. in the late first stage acts like a charm. A quick labour often occurs after it.

Avoids the necessity for use of instruments in midwifery practice. It is of very little use in cases of abortion having little effect in the early months. Later and especially during labour effects are striking. The injections appear to act best in the latter part of the second stage of labour.—L ii./12,544.

INFUNDIN injected in midwifery—0·5 Cc. deeply into the buttock after the *os* is well dilated. Labour is shortened and suffering of the patient lessened.—B.M.J. i./19,432.

Indundibulin 0·5 Cc. every ½ hour with Chloroform anæsthesia in labour. Partial anæsthesia maintained and uterus kept active.—A. F. Martin, B.M.J. ii./22,672.

The injection must not be given too early. Wait until the *os* is well dilated otherwise there is risk of danger to the child. Further there is risk of retained placenta by the uterus contracting over it. Remove as rapidly as possible by expression if necessary. It is important to see that clots as well as placenta are quickly removed. Give Liquid Extract of Ergot 1 drachm immediately after delivery of placenta and 2 grain Ergotin Pills at 4 hour intervals.—R. Rolfe, B.M.J. i./19,728.

Pituitary Extract in labour—review of literature.—Pres., Jan. 23,33 May '24,212.

Galactagogue action of Pituitary.

In an 'Experimental Investigation of the mechanism of milk secretion with special reference to the action of Animal Extracts' K. Mackenzie (Jl. of Exp. Physiology, Dec., 1911) communicates interesting results.—Extracts from the pituitary body, corpus luteum, pineal body, lactating mammary gland and involuting uterus were found to possess *galactagogue action*—the pituitary gland being the most active. The galactagogue substance of the pituitary body is not destroyed by drying or boiling a weak Saline Extract. Intra-

venous action is rapid—the matter of a few seconds. Experiments were made on lactating cats—the amount used was 5 Cc. of the Extract = the active principle of 3 pituitary bodies of the ox. Pituitary secretion may be increased during lactation. Extracts of the pituitary body of the fowl are also actively galactagogue injected into cats. It is suggested as of commercial value to determine whether the amount of cow's milk would be similarly increased. Experiments showed that hormones inhibitory of mammary secretion are formed by the fœtus and placenta—see also Atropine and Pilocarpine.

Experiments on the depressor action of Pituitary Extracts indicated that when the blood becomes saturated with Pituitary Extract, an interaction takes place, which converts its constricting action on the peripheral vessels into a dilating one.—P.J. i./12,10.

Intestinal toxæmia.—Chronic constipation in, well treated with Pituitary Extract hypodermically and *per os*.—Glas. Med. Jl., Sept./13,177.

Paralytic distention of the intestines—possibly of value in.—New and Non-Off. Remedies, 1914. See also G. R. Murray, Clin. Jl., Aug. 1/23,364.

Heart failure successfully treated. Immediate effect required which could not be obtained from digitalis, strophanthus, etc.—L. i./15,289.

As a temporary cardiac stimulant in acute diseases, such as pneumonia, Pituitrin has been found successful, when Strychnine and Camphor have failed.—G. R. Murray, Clin. Jl., Aug. 1/23,364.

Rickets, Pituitary Gland in—on the grounds that Pituitrin was found of value in osteomalacia and that the view is held by many that rickets and osteomalacia are manifestations of one and the same disease—the one in early the other in later life. The gland contains a considerable quantity of Phosphorus. Disturbances of Phosphorus metabolism are thought to contribute to rickets.—B.M.J.E. i./13,24.

Output of urine in polyuria reduced by the pituitary extract increasing the capacity of the kidneys to secrete a concentrated urine. Effect useful in diabetes but transient, lasting for a few days only.—B.M.J. ii./16,298.

Diabetes insipidus treated by 2 Cc. of Injection hypodermically.—B.M.J. ii./18,197. Antidiuretic effect marked.—M. Davidson, L. ii./20,401.

The active principle of Pituitary is *possibly* allied to Ergamine.—Aldrich and Guggenheim, *see* B.M.J. ii./21,722.

SEVERE HÆMOPTYSIS: Pituitrin, ½ to 1 Cc. intramuscularly, the best immediate remedy. Nitrites increase pulmonary pressure and blood flow.—W. H. Wynn, per Clin. Jl., Jan. 24/23,47.

Serum shock and serum sickness well treated with Pituitary Extract or Adrenalin Solution 1 Cc.—W. M. Crofton, Pres., June '23,235.

In cancer as a palliative.—J. H. Norgate, per Pres., June '23,238.

Diabetes treated by Pituitary Extract.—P. J. Cammidge, Pr., Oct. /20,244.

In Insulin hypoglycæmia, an effective antidote and inhibits Adrenalin hyperglycæmia or glycosuria.—J. H. Burn, per Pres., Oct. 23,334.

In two cases of asphyxia pallida in newly born children, striking results obtained from intramuscular injection of Pituitrin 0·3 Cc.—J. G. Cormack, B.M.J. i./24,570. Also intracardiac injections.—E. H. Rainey, *ibid.* 747.

Pituitary disorders.—Pres., May '24,209–211.

Pituitary extract is not destroyed by the gastric and intestinal enzymes, Pepsin and Pancreatin. The pressor action remains unchanged after action by these enzymes.—Pres., May '24,212. (F. W. Gamble, B.P. Conf., 1923, said the posterior portion was destroyed by the pancreatic juice).

Herpes zoster successfully treated.—Pres., May '24,213.

Bleeding stopped in a case of hæmophilia after one local application and one subcutaneous injection.—Pres., May '24,213.

Prostate Gland.

An extract of both human and canine, intravenously causes contraction of the bladder and lowers blood pressure.—Battey, Sem. Med., Jan. 15/13.

Liquid extracts of the gland are extremely toxic.—per Pres., Oct. 23,360.

Spleen Substance Desiccated.

Dose.—5 to 10 grains (0·3 to 0·6 Gm.) 1 part represents 5 of the fresh spleen. Has been used in anæmia, tuberculosis, myxœdema, etc. Value in typhoid and malaria possibly due to splenic hormones.

✱**Hormonal** (T.M. 330346). *Dose.*—15 to 20 Cc.—less for children.

Said to be a solution of the Hormone of the spleen to which peristaltic action is due. *Two forms* are made—*for intramuscular injection* and *for intravenous*

use. Castor Oil (1 ounce) is to be given simultaneously with the intramuscular injections. The intramuscular dose produces, on injection in equal quantities into the right and left gluteal muscles, an effective evacuation. For use in chronic constipation and acute intestinal paralysis. Effects said to be lasting. 20 Cc. Ampoules are prepared, has also been given *per os.*

Two cases benefited by a single injection. Effect difficult to understand.—O. Leyton, B.M.J. i./15,246.

L. Levi quotes many authorities, mostly French and German, to show that Splenic Extract is useful in malaria, typhoid, tuberculosis, in hæmorrhagic conditions such as menorrhagia, and in anæmia.—per Pres., Oct. 23,341.

Kinazyme Tablets.—A preparation made from extract of spleen, enterokinase and other enzymes and hormones of the duodenum, also pancreatic substance and trypsin, with ⅛ grain calcium lactate in each tablet. In malnutrition, anæmia, etc., especially in tuberculosis.

Suprarenal Gland.

An average sheep's gland weighs about 2 Gm. (30 grains).

The glands are situated at the top of each kidney.

The fresh gland was first given to relieve Addison's disease, then dried preparations were used, also liquid extracts, and lastly an active principle, Adrenalin, which, in the form of its hydrochloride is now used both internally and externally. The compound is however thought to be destroyed by the stomach, but Hale White says gastric contents have no effect on it and he attributes absence of efficacy *per os* on the mucous membrane of the stomach and intestines to dilution, and adds that it is not absorbed by these.

These preparations cause contraction of small blood vessels when applied locally, blanching the skin or mucous membrane. Locally there is an astringent action, and capillary bleeding, epistaxis and menorrhagia are checked; useful for bleeding after tooth extraction and of the greatest value applied to the nostrils for hay fever and coryza. It is applied by the surgeon to check bleeding and blanch the parts for operations on the eye, ear, nose, throat and larynx.

Distribution of the Adrenalin.—It is thought that Adrenalin is produced in the **cortex** as well as in the medullary portion of the gland, and that it is stored in the medulla. The cortex is probably the indispensable part of the adrenal. The medulla, apparently serves merely to reinforce the sympathetic system in time of stress. —Pres, May '24,203-4.

Adrenal Glands are a source of power. They control the sympathetic system, and thereby dominate the 'fight' and 'flight' reactions. But the power quality of the adrenal-centred type is objective, and depends on immediate stimulation. The power coefficient of an individual may be made up of the combined pituitary and adrenal hormones, and varies in type according to which of these predominates. Thus the pituitary-centred individual gives the type with the power-fantasy, while the adrenal-centred individual provides one with power-energy. Our Napoleons, Bottomleys and Northcliffes are presumably pituitary-centred, while the classical type of British Naval Officer can be classed as adrenal-centred.—H. Crichton Miller, B.M.J. ii./22,553. *See also abstracts under 'Pituitary' and 'Thyroid.'*

E. Gley thinks that Adrenalin is not necessary for normal functioning of the nervous system, and is not essential to maintenance of normal life.—per Pres., May '24,203.

The active principles of the Thyroid and Suprarenal Gland are supplemented by the supply of Oxygen—diminution of same has a very definite effect on the central nervous system. Asphyxia brings about an accelerated secretion of Epinephrin, chiefly due to lack of Oxygen. On the other hand the balance of CO_2 cannot be ignored. Its excessive removal from the blood brings

about prompt and dangerous fall in blood pressure, due to depression of the vaso-motor centres of the bulb and spinal cord.—Prof. J. C. Meakins, L. ii./22, 230.

Uses.—The gland is really only effective when its preparations are injected or when they can reach the actual bleeding surface—hence will stop hæmatemesis, but not hæmoptysis; it may also be given to relieve syncope from chloroform. Its use has been suggested in Graves' disease and Addison's disease. *For further details see Adrenalin.*

Suprarenal Gland, Dry.

Dose.—½ to 3 grains, three times a day.

Tablets, Compressed, each equivalent to ½ and 1 grain of **Dry Gland Substance,** are prepared.

Suprarenalum Siccum. U.S. IX. *Average dose.*—4 grains. Suprarenal glands of animals which are used for food by man, freed from fat, cleaned, dried and powdered. Contains 0·4 to 0·6% epinephrine and if assayed biologically 1 Gm. contains the equivalent of 10 mgr. lævo-methylamino-ethanol-catechol (adrenalin). Ash limit, 7%.

In practice we find an average sheep's gland weighing 30 grains yields 5 grains of dry powder.

Addison's disease.—O. Leyton, B.M.J. i./15,245, says it needs 20 to 30 grains thrice daily continued indefinitely.

Exophthalmic Goitre.—Suprarenal gland eulogised. Pulse rate reduced, protrusion of eyeballs disappears. The thyroid gland diminishes. Tremor and every other nervous symptom vanishes and patient is restored to health as stated by the late G. Gibson.—L. ii./12,216. See also Hector Mackenzie L. ii./16,815.

Suprarenal Snuff.

Dry Suprarenal Gland 1, Menthol 2, Ammonium Chloride 6, Boric Acid 4, Lycopodium 4, for use in hay fever.

Addison's disease.—G. R. Murray states that he has never seen permanent improvement as a result of treatment with Suprarenal Gland.—Clin. Jl., Aug. 1/23,363.

Insufflation Powders for hay fever, of the following formulæ, have been suggested:—

(1) Adrenalin 1, Zinc Stearate 100, Heavy Magnesium Carbonate 900.
(2) Adrenalin 1, Zinc Oxide 100, Bismuth Subcarbonate 400.
(3) Suprarenal Gland Substance 1, Zinc Stearate 20, Zinc Oxide 80.

Tabellæ; Chocolate, contain ½ grain of dry substance equivalent to 4 grains of fresh gland, and are agreeable for internal use.

Liquid Extract of Suprarenal Glands.

Dose.—10 to 15 minims (**0·6 to 0·9 Cc.**). *Hypodermically,* 1 to 5 minims as such or diluted with normal saline.

Prepared with glycerin, strength 1=1 of fresh gland. It was with this preparation that all the early valuable results were obtained. For local application rarely used stronger than 10%.

Suppositories contain 3 minims of Liquid Extract in 15 grains of Gelatin basis; to check bleeding piles.

℞ ℙ **Suppositories, Suprarenal with Morphine.**—These contain ¼ grain of Morphine Hydrochloride in addition.

Suprarenal Ointment.—Liquid Extract of Suprarenal Gland 50 minims, Liquid Paraffin 2 drachms, Hydrous Wool Fat to 1 ounce. It may be scented with Otto of Rose.

Nebula Extracti Suprarenalis—Contains 5% of Liquid Extract For use as spray in hay fever and coryza.

Adrenalin. *Off.* (ADRENALINUM). P. BELG., FR. CX. (Tests are given). *Syn.* **Adrenine, ✱Hemisine** (T.M. 250250), **Renaglandin, Suprarenin, Adnephrin, Paranephrin, ✱Vaso-Constrictine** (T.M. 288888), **✱Vasotonin** (T.M. 326554).

The empirical formula usually given is $C_9H_{13}NO_3$=183·157 *i.e.* $(OH)_2.C_6H_3.CH(OH).CH_2.NH.CH_3$.

It is an active principle of the Suprarenal gland, light brown or almost white powder or in grey crystals (first prepared by Takamine). It appears to maintain a proper degree of contraction of the arteries and hence to correct blood pressure.

Soluble slightly in hot water, also more readily in Hydrochloric Acid, and Boric Acid Solution forming corresponding salts. From concentrated solutions it is precipitated by alkali. Aqueous solutions of its salts are lævorotatory.

Insoluble in alcohol, ether, chloroform, petroleum ether and other organic solvents. Oleic acid is a poor solvent. Not precipitated by ordinary alkaloidal reagents. It is chemically a powerful reducing agent.

On heating above its melting point (263° C.) it decomposes with an odour resembling opium smoke.—FR. CX. B.P., 1914, states M.Pt. 205 to 212° C. with partial decomposition. We found commercial Adrenalin to darken at 194° C. and melt at 204° C.

Epinephrin is an allied blood pressure raising principle different chemically from suprarenin. Maben's Paper on the introduction and priority of Adrenalin.—P.J. i./07,388 ; *see also* Vol. II.

Manufacture.—The suprarenal glands are reduced to pulp and macerated, excluding oxygen as much as possible, in warm (50° to 80° C.) water or very dilute acid for 5 hours, the mixture being then heated at 90° to 95° C. to coagulate albuminoids. This aqueous extractive is evaporated and extracted with alcohol. Precipitation from this liquid of impure Adrenalin follows by means of ammonia. It is purified by ether-alcohol, and re-precipitation with ammonia or fixed alkali.

Suprarenin — Ortho - Dihydroxyphenylmethylaminomethylcarbinol. *Syn.* Ortho-dioxyphenylethanolmethylamine, is synthetic Adrenalin with allied properties.

Natural Lævogyrate Adrenalin possesses a vaso-constrictive action which is more than double that of the racemic (synthetic) product, the exact relationship being, 1=0·46, and from this may be inferred the dangers attending the use of a product not possessing the full activity of the official substance. —Tiffeneau, C. D., May 28/21, p. 708.

r-Adrenalin in small doses of order of 0·01 mgm. increases the blood pressure to a somewhat lesser degree than l-Adrenalin, the difference in activity in general is about 10–15% but may be 25–30%. As dose is increased to 0·0 mgm. this difference disappears entirely so that, the usual therapeutic dose being 0·04-0·1 mgm., there is no disadvantage in the use of the synthetic racemic compound.—J.C.S.A. i./22,891.

Substances possessing an Adrenalin-like action have also been found in putrefying meat, *vide* **Hydroxyphenylethylamine.**

Liquor Adrenalini Hydrochloricus. Adrenalin Chloride Solution. *Syn.* GUTTÆ ADRENALIN. R.O.H. *Dose.*—10 to 30 minims (**0·6 to 1·8 Cc.**), by the mouth.

Adrenalin 1, Chloroform 5, Sodium Chloride 9, Dilute Hydrochloric Acid 3, Distilled Water, freshly boiled and cooled to 1,000.

The original preparation contains 1 of Adrenalin Chloride in 1,000 f Normal Saline Solution, with 0·5% of Chloretone.

Hypodermically 1 Cc. injections of the 1 in 1,000 Solution are given r it may be diluted with Normal Saline Solution 10 times (or less). ommercially a solution of strength 1 in 10,000 is made and other ilutions may be prepared freshly as required.

Sterilisation of Adrenalin in boiling water for even up to three hours oes not affect activity. The natural Adrenalin product is more stable than ne synthetic.—L. W. Rowe, P.J. i./14,755; Am. Jl. Ph., April, 1914,145.

Uses.

Locally applied, it is of great value in arresting local hæmorrhage, he part becoming blanched—hence its use in superficial wounds nd abrasions, in tooth extraction and nose bleeding and during peration to stop capillary hæmorrhage. Solutions are useful in oryza, hay fever and asthma. It may be given by the mouth to heck hæmorrhage from the stomach or injected into the rectum, ladder and uterus for bleeding. Applied locally, the vascular onstriction lasts ½ to 2 hours. It reduces the swelling in giant rticaria. It is of no value in hæmoptysis; of little use in remote æmorrhage however given, in fact the rise in blood pressure may ncrease the hæmorrhage. Hypodermically, it does not materially aise the blood pressure, as the local vascular constriction prevents bsorption. Intravenously it is successful in surgical shock, circuatory failure and asthma.—Mitchell Bruce.

In nose operations, submucous injection of 10 minims of 1 in 10,000 solution with 5 minims of 1% Cocaine Hydrochloride is utilised to lessen blood ow.

Asthma.—1 to 5 minims hypodermically gives prompt relief in many cases. ontinued daily use of even large doses has no harmful effect.—G. R. Murray, in. Jl., Aug. 1/23,363. Numerous earlier refs.: last Edn., p. 928.

Suprarenal inadequacy believed to be the fundamental fault in the incidence asthma. Many cases get relief from an injection.—T. Drummond, B.M.J. /23,320.

Evatmine contains Adrenalin and Pituitary.

Collapse in diphtheria and in pneumonia has been treated by 0·5 to 1 Cc. jections every 1 to 2 hours. *Intravenous injections* of Saline (*q.v.*), with 6 8 drops of the Solution to the litre, are practised, also in chloroform syncope nd other forms of heart failure.

Pertussis.—Children have taken 1 to 3 drops *per os* or less, according to age, very 3 or 4 hours with good effect.

Possible danger.—An anæmic boy of 15 had his nose packed with gauze aked in 20% Cocaine Hydrochloride and 1 in 4,000 Adrenalin half an hour fore operation for hypertrophied turbinates and adenoids. Patient collapsed nder further injection of 5 minims of 1 in 1,000 solution. The symptoms ay have resulted from anæmia of the bulb.—J. Allan, Pres., 1913.

Intractable hiccough treated with Adrenalin after Bromide, Chloral, Chloroorm and Cocaine in turn had been found of no avail. In a fit of violent and inful hiccough, lavage with Silver Nitrate, and general anæsthesia under hloroform were equally unsuccessful,—finally two doses of 10 drops of drenalin Solution caused it to cease.—P.J. ii./13,808; C.D., Jan. 10, '14.

In gastric ulcer probably the best drug to control hæmorrhage. To raise ood pressure in shock and in pneumonia repeated small doses—1 Cc. of 1 1,000 every hour required.—O. Leyton, B.M.J. i./15,245.

Adrenalin in Chloroform anæsthesia, see p. 302.

Braun considers that Adrenalin should be injected in very dilute solution, e maximum *dose* being 0·5 mgr., *i.e.*, 0·5 Cc. of the 1 in 1,000 Solution diluted th 50 to 200 Cc. of a Cocaine Solution.

Intracardiac Injection in resuscitation. No drug known comparable with Adrenalin in efficacy to start an arrested heart or to antagonise the action of Chloroform. The power of Adrenalin, which is equivalent to stimulation of the sympathetic nerve of the heart—to antagonise a *muscular* paralysis, has not been sufficiently realised. For resuscitation in cardiac arrest, therefore, artificial respiration should be resorted to first by the usual methods. If at the end of 3 or 4 minutes no pulse can be felt, and especially if no heart beats can be heard on auscultation, adrenalin should be injected into an external jugular vein. The abdomen should be opened high up, one hand inserted in the opening, passed up over the left lobe of the liver and the heart massaged intermittently.—J. A. Gunn, B.M.J. i./21,9. *See also* C. Walker, *ibid.*, 46 and J. P. Lockhart-Mummery, *ibid.* 100. (According to the last authority it was possible to revive a cat 20 minutes after all signs of life had ceased. In use it was found more effective to inject a 1 in 50,000 solution of Adrenalin intravenously than to inject into the heart.)

When used for resuscitation, it is necessary to temporarily establish an artificial circulation to carry the drug to the periphery. It acts on the peripheral vessels, chiefly the peripheral arterioles, hence, the intravenous injection is necessary in 2 parts or more, and in dilution of about 1 in 50,000.—J. P. Lockhart Mummery, B.M.J. i./21,582.

Injection of 1·2 Cc. (20 min.) into left auricle gave recovery of heart action, after failure under spinal anæsthesia.—Julius Gottesman.—M.P.C., Nov. 1/22,373.

Hypotension is caused by the protein particles becoming hydrated or precipitated and may result in what is clinically known as "shock." The best remedy for hypotension appears to be the intravenous injection of a 15% Glucose solution and 0·0025 Gm. of Adrenalin. In less acute cases, 0·001 Gm. doses of Thyroxin or metallic preparations may be injected. No remedy appears of use in chronic cases. "**Ageratin,**" a specially prepared testicular extract, has been used to prevent both hypo- and hypertension.—J. E. R. McDonagh, M.P.C., Jan. 23 and 30, 1924.

Intracardiac (right ventricle) injection of 1 Cc. of Adrenalin solution (originally recommended by Winter against sudden abolition of the heart's action by narcotisation—animal experiments were encouraging.) The patient was considered dead. Heart action had definitely stopped. A few seconds later there was commencement of the heart beat and 2½ hours afterwards the patient could walk a few steps. It saved his life. Bibliography of a number of similar cases.—C. Bodon, L. i./23,586.

In a case of anæsthetic syncope in which heart and respiration ceased for 10 minutes, 5 minims of a 1 : 1,000 solution injected into the heart muscle gave astonishing and immediate results—the pulse began again "with a leap" the moment after the injection. The instantaneous action of the drug in restoring the pulse attested to by many observers.—K. R. Hill, Clin. Jl., Feb. 28/23,104.

Intracardiac injection of Adrenalin greatly superior to the ordinary cardiac stimulants in cases of sudden failure of the heart.—J. G. Reed, B.M.J. i./24,820

Enthusiastic reports on the value of intracardiac injection of Adrenalin in

cases of heart failure. Its value is confined to temporary stoppage of the heart. It will not relieve a heart permanently affected, nor restore the organism as a whole.—Pres., May '24,206.

WHOOPING COUGH. Value of Adrenalin.—L.i./21,1312.

STOKES-ADAMS ATTACKS well treated with Adrenalin Solution (5 m. doses) subcutaneously.—A. G. Phear and J. Parkinson, L. i./22,933.

POST-ANÆSTHETIC VOMITING checked by 5 to 8 minims Adrenalin Chloride Solution *per os*.—V. Macdonald, per Pres., Jan. '23,5.

Vomiting in malaria well treated with Solution Adrenalin Hydrochloride, 7 to 8 minims—one dose sufficient.—E. Lomax Wood, per Jl. Trop. Med., Aug. 1/22,248.

A lady gave herself 20 minims of the solution hypodermically for asthma and repeated it every two hours, with little relief for six doses. On arrival home she had administered 120 minims of undiluted solution. Her condition was alarming, she collapsed and her pulse was almost indistinguishable but improved quickly on use of Amyl Nitrite.—F. R. Sawdon, B.M.J. ii./22,866.

Vertigo successfully treated with Adrenalin *per os*. Barbazon insists on the necessity for large doses of the drug—from 10 to 15 drops twice a day and sometimes more. A lasting cure was obtained by giving 20 drops a day. —per Pr., Sept. 23/232.

Adrenalin as a potential factor in hyperthyroidism. Berthelot isolated from the intestine a bacillus (B. phenologenus) which converts Tyrosin into Phenol. Possibly Adrenalin may be formed from Tyrosin.—D. J. Harries, B.M.J. i./23,1015.

Influence of the thyroid gland on the response to Adrenalin.—D. Murray Lyon, B.M.J. i./23,966.

Experiments to ascertain the effect of changes in concentration of Hydrogen-ions on the action of commercial Adrenalin, and of the active principle of the adrenal medulla, Epinephrin. Eyes of toads used.—R. McCarrison, B.M.J. i./23,101.

People sensitive to Adrenalin absorption are generally also sensitive to Novocain absorption.—B.M.J. i./24,715.

Antagonism exists between Histamine and Adrenalin.—Pres., May '24,204.

Adrenalin secretion is stimulated by Strychnine and Physostigmine. Partial adrenalectomy slightly lowers the resistance of rats to Morphine, and complete adrenalectomy causes great susceptibility to the drug.—Pres., May '24,204.

C. E. de M. Sajous suggests that Vitamin C is the homologue of Adrenalin. Deficiency of Adrenalin underlies the genesis of scorbutus as a deficiency disease. The internal secretion of the adrenals, in traversing the lungs, takes up oxygen and forms adrenoxidase. This corresponds biochemically with a plant oxidase, known as tyrosinase. This substance, he thinks, is Vitamin C. —per Pres., May '24,205.

Fractures have been well treated by administration of Adrenalin solution 10 drops and Calcium Phosphate 0·1 Gm., twice daily, in addition to the usual treatment.—Pres., May '24,206.

Alopecia—following a history of scarlet fever, fright and malaria—well treated by injection of adrenal lipoids and dried thyroid *per os*.—Pres., May '24,207.

Decoloration of Solutions—The solution is liable to turn brownish on exposure. Loss of activity is proportional to this colouration.

In some experiments which we conducted we found that a small quantity of formalin added retards the colouration of Adrenalin solution.

Adrenol Solution.—A solution of the Adrenal active principle in oily solution. Suitable for spray with an oil atomiser. Dissolve Adrenalin 1 in a mortar with Alcohol 7 and Hydrochloric Acid *q.s.* (0·2 of actual HCl = 0·6 of P.B. Acid approximates theory: we find in practice a little more may be necessary), then add Absolute Alcohol *q.s.* to 12·5 and make up to 1,000 with Castor Oil. Eucalyptol 5 may be incorporated if desired.

Adrenalin Inhalant.—A preparation containing Adrenalin Chloride 1 in 1,000 made with aromatised Hydrocarbon Oil. Is soothing and astringent in inflammatory affections.

Dilutions for use. As spray the Adrenalin Chloride Solution in Normal Saline is diluted to 1 in 2,500, or even 1 in 5,000 parts, is effective in the nostrils or within the uterus.

Adrenalin Tablets are made containing $\frac{1}{65}$ grain (0·001 Gm.) and $\frac{1}{200}$ grain (0·0003 Gm.).

℞ ℙ **Sterules, Hypodermic** of Cocaine Hydrochloride $\frac{1}{3}$ grain with Adrenalin $\frac{1}{1000}$ grain in 15 minims for dentists' use are prepared.

℞ ℙ **Tablets of Adrenalin** ($\frac{1}{300}$ grain), with Cocaine Hydrochloride ($\frac{1}{6}$ grain) are prepared for dental use. They will fit into cavities where pulp has to be extirpated, or may be dissolved in 15 to 30 minims of water forming a solution suitable for ordinary cases.

Sterules, Hypodermic of Adrenalin Chloride Solution (contain 10 and 15 minims) with elongated ends, which may be snapped off; these are a great convenience, particularly in dental work to check hæmorrhage after tooth extraction.

The 15 minim size are for use with the β-Eucaine Powders in **Infiltration Analgesia.**

Adrovaine Sterules contain Adrenalin 0·00025 Gm. ($\frac{1}{250}$ grain). with Stovaine 0·02 Gm. ($\frac{1}{3}$ grain). **Hypodermic Tablets of Adrovaine** are also made same strength.

Sterules, Ophthalmic of Adrenalin Chloride Solution are prepared. In these, the activity of the solution persists, in all probability for years, owing to their being hermetically sealed.

Adrenalin Lamellæ for ophthalmic use contain $\frac{1}{1000}$ and $\frac{1}{500}$ grain.

Styptic Gelatin.

Gelatin 1½ grains, Adrenalin Solution 15 minims, Water *q.s.* to 60 grains—this quantity for a dose; contains Salicylic Acid 1 grain to the ounce to preserve. Suggested for internal hæmorrhage.

Suppositories, Hollow, of Cacao Butter are prepared, containing 10 minims of the Solution (15 and 30 grain size). As also 1 in 1,000 of the Adrenalin Chloride in the Theobroma mass. For hæmorrhoids.

℞ ℙ **Suppositories of Adrenalin, Cocaine, Hamamelis and Formidin** contain Cocaine Hydrochloride ¾ grain, Hamamelis Extract 3 grains, and Formidin 3 grains. Germicidal, analgesic and tonic astringent. They may be made 15 grain size with 1 of Adrenalin in 1,000 of the basis.

℗ **Trochisci Adrenalin** contain each:—Adrenalin, $\frac{1}{1000}$ grain Heroin, $\frac{1}{100}$ grain; Ipecacuanha, $\frac{1}{50}$ grain; Red Gum, 2 grains Rose basis *q.s.* to 20 grains. These are astringent and sedative.

Unguentum Adrenalin. Adrenalin base 1, Lanolin Ointmen 5,000, scented with Geranium Oil. Useful in the nostril in acute coryza and inflamed mucous surfaces.

In neuralgia, neuritis and reflex or referred pain, small quantitie may be rubbed in with advantage.

℞ ℙ **Adrenalin Catheter Lubricant.**—Adrenalin (base) 1, Cocaine 10 Atropine 10. Dissolve the Adrenalin in Hydrochloric Acid (*Off.* *q.s.* (0·6 is usually sufficient) diluted with Absolute Alcohol 30 Dissolve the alkaloidal bases in Oleic Acid 20 and mix this and th Adrenalin Solution with sufficient Castor Oil and Absolute Alcoho in proportion of 4 to 1 to make 1,000 of the lubricant.

Adrenalin Gauze.—Gauze impregnated with Adrenalin Solution, at th time of use, for local application.

Adrenalin Tape ½ inch wide in 10 yard lengths, also 1½ inch wid in 5 yard lengths, in glass jars.

Isoamylamine and **para-hydroxyphenylethylamine** (*q.v.*) are presso substances like Adrenalin found in putrid meat and Ergot. UnlikeErgo the pressor action is produced when taken by the mouth. The action, thoug less marked, is more prolonged than of Adrenalin.—B.M.J. ii./09,540.

Suprarenal Cortex, Desiccated. (1 = 6 of fresh gland tissue.) *Dose.*—2 to 5 grains thrice daily.

This has been prepared and used experimentally on the assumption that the cortex has a function distinct from the medulla. The matter is *sub judice.* Tokumitsu (Jap., Med. World, Oct. 15,23) finds the cortex closely associated with the internal secretion of the pancreas in carbohydrate metabolism. It is functionally antagonistic to the thyroid. If it be destroyed exophthalmic goitre is produced. Its secretion lowers blood pressure and is water soluble. It is antagonistic to Adrenalin and inhibits its secretion by the medulla. *See also* Distribution of Adrenalin *antea.*

***Epinine.** (T.M. 320407). *Syn.*—3-4 DIHYDROXYPHENYLETHYL-METHYLAMINE. $(OH)_2.C_6H_3.CH_2.CH_2.NH.CH_3 = 167{\cdot}157$ was obtained by Pyman [J.C.S. 97 (1910) 264] from 1-Keto-6-7 dimethoxy-2-Methyl-tetrahydro-isoquinoline by heating it with Hydrochloric Acid at 170 to 175° C.

It differs from Adrenalin by the absence of an aliphatic OH (*cf.* formula). It is supplied in 1% solution to be diluted with Normal Saline. It resembles Adrenalin in action, but the rise of blood pressure though not so intense is said to be more prolonged. For use in ophthalmic work 0·1%, as a styptic to bleeding surfaces 0·1 to 1%, hypodermically 1% and intramuscularly 0·1% solutions are used.

Testis.—The use of an extract from the testicles of animals was asserted to reanimate sexual power.

Liquor Testicularis, Orchic Fluid. *Syn.* ORCHIDIN, TESTICULIN. *Dose.*—15 to 30 minims hypodermically, or by the mouth.

Prepared from the testes of animals (preferably guinea-pigs), by maceration with glycerin and subsequent filtration under pressure in contact with carbonic acid, by d'Arsonval's process.

Has been tried for anæmia with irregular menses—injections made between periods, preferably into muscular substance.

In neurasthenia has been found helpful.—L. ii./13,1455.

Sterules of **Testicular Extract** 10 minims, **Sodium Glycero-phosphate** 2 grains and **Strychnine Hydrochloride** 1/60 grain are made.

Tablets of Didymin (Testicular substance), 5 grains.

STEINACH OPERATION.—22 cases. Contraindicated in advanced senility or seriously impaired cardio-vascular apparatus. The operation is harmless. It causes increased thyroid activity and stimulates other glands if delinquent; increases activity of interstitial cells.—H. Benjamin, per Pres., Oct., 1923, 357. J.A.M.A. says no instance of "rejuvenation" has been reported.—*Ibid.* 358.

Results of injection of Testis substance (ram's or goat's) in 650 patients. Neurasthenia, senility, loss of sexual appetite, melancholia, etc., were benefited, acne cleared up, asthma was relieved and tuberculous patients improved.—L. L. Stanley, *ibid*, 359.

Both Hypo- and hypertension can be treated by Ageratina testicular extract.—J. E. R. McDonagh, M.P.C., Jan. 23rd and 30th, 1924.

*"LYMPHOID (T.M. 337965, 337966) COMPOUND CAPSULES," Testicular Lymphatic Glands, with Brain and Spinal Cord Extracts 2 grains, Iron Glycerophosphate ½ grain, Sodium and Calcium Glycerophosphates 2 grains, Aloin 1/20 grain—in each capsule. *Also obtainable without the glycerophosphates and without Aloin. Dose.*—One capsule thrice daily or less, ½ hour before meals.

This preparation has been used in neurasthenia and general debility, melancholia, malnutrition, neuritis, impotence, insomnia, neuralgia, rheumatic affections, epilepsy and kidney diseases.

"LYMPH SERUM." *Syn.* *LOWENTHAL'S LYMPHOID SERUM. (T.M. 334796, 337965, 337966, 346373). (For Hypodermic use only.) *Dose.*—10 minims (0·6 Cc.) daily in the gluteal region.

Contains Orchic fluids, Extracts from Lymphatic Glands, Spinal Cord and Brain, together with Gold Chloride and Sodium Chloride ($\frac{1}{30}$ grain to 10 minims) as preservative. Microscopically it is stated to show spermatozoa, leucocytes, crystals of Lecithin, Nucleinic Acid and Spermin. *Uses*; as the preceding. Parry has reported on the analysis of these preparations. Said to be obtained by the extraction of lymphatic fluid from the glands of young goats and bulls.

***Testogan** (T.M. 414020).—*Dose.*—A tablet three times daily after meals. A preparation of the hormones of the reproductive glands and of the glands of internal secretion. Suggested for use in impotence.

***Thelygan** (T.M. 414021).—*Dose.*—As for Testogan. A preparation made on similar lines for women. Suggested for infantile sterility, undeveloped mammæ, frigidity, sexual disturbances in obesity and other metabolic disorders, climacteric symptoms, amenorrhœa, neurasthenia, hypochondria and dysmenorrhœa.

They are also made in ampoules for intragluteal injection.

Thymus Gland, Desiccated.

Dose.—3 to 10 grains (**0·2 to 0·6 Gm.**).

One grain of this powder represents 8 grains of the fresh gland of the calf. Has been given to improve the defective nutrition in childhood, Graves' disease, hæmophilia, for anæmia, chlorosis and leucocythæmia, rheumatoid arthritis, and diabetes, and in tachycardia.

Tablets, 3 and 5 grains.

In infantile paralysis Thymus Gland is indicated. A child can take 15 to 20 grains in 24 hours.—W. MacKenzie, B.M.J. i/15, 63.

Liquid Extract of Thymus Gland. 1=1.

Dose.—$\frac{1}{2}$ to 2 drachms (**2 to 8 Cc.**).

A. E. Garrod.—Clinical aspects of the thymus gland.—B.M.J. ii./14,571.

Enlargement of the thymus sometimes accompanies, and may be the cause of, sudden death with heart failure ('thymus death')—frequently occurs during anæsthesia. Thymic enlargements may cause attacks of difficult breathing ('thymic asthma').—Per Pres. Oct. '23,262. J. A. Hammar says that there is no reliable evidence that sudden death is due to abnormality of the thymus. Death may follow as a result of asthma, but in 'thymus death' the thymus plays no part.—*Ibid.*

Psoriasis well treated by Thymus Extract intramuscularly.—Per Pres. Oct. 23,365. Psoriasis, lichen ruber planus, verrucosis and ichthycosis can be cured or greatly improved by exposure of the thymus to X-Rays.—W. Brock, *ibid.* In exophthalmic and colloid goitre it has good effects (some say contraindicated!), especially if combined with Iodine.—*Ibid.* Tardy growth and non-development in children appear to benefit from its use.—*Ibid.* Should be given with caution to gouty persons and in pregnancy.—*Ibid.*

The thymus thought to be the central organ for metabolism of vitamins in young animals and that after puberty the vitamins are stored in the sex glands to provide for the first endowment of the progeny.—Per Pres., Ma '24,228.

Man is more sensitive than animals to thymectomy. Removal of the thymus before puberty produces abnormal conditions, leading to death. It has a trophic as well as an evolutive action. It also has an important influence on the calcium metabolism, the bones becoming hypocalcified after thymectomy.—Pres., May '24,229.

Acidum Thyminicum. *Syn.* ***Solurol.** (T.M. 264148). Nucleotin-phosphoric acid. *Dose.*—5 to 10 grains (**0·3 to 0·6 Gm.**) after meals.

Approximate composition:—$C_{20}H_{35}N_3O_{16}P_2$ (Kossel)=635·484. A product of the metabolism of the nucleins present in food containing nucleo-proteins, *e.g.*, thymus gland, pancreas, spleen, etc. It possesses affinity for, and solvent action on, Uric Acid. Uric Acid formed in the body without its equivalent of Thyminic Acid is stated to

precipitated. It is, therefore, employed in the treatment of gouty affections; 1 of the acid will dissolve 1·3 of Uric Acid at 100° F. *in vitro*. It has no especial incompatibilities when in solution. Feebly acid, but as far as uric acid is concerned it probably acts as a base. It is thought to be non-toxic and non-depressant. Has been given in 2 grain doses by **intra-muscular injection** in severe gouty affections, especially neuritis.

Soluble with ease 1 in 5, stronger solutions may be prepared, but it is mostly prescribed as **Thyminic Acid Tablets**, 4 grains, and in Cachets.

Thyroid Gland.

One lobe (½ gland) of the sheep's gland, we find, weighs on an average about 35 grains and yields about 9 grains of dry thyroid.

This gland and preparations made from it, have been employed for relieving myxœdema, cretinism, lupus, psoriasis and chronic eczema. Latterly its use has extended to obesity, menstrual disorders, neurasthenia, insanity, migraine and chronic rheumatic affections. The methods employed have been (1) by feeding with the glands; (2) by grafting (Victor Horsley, B.M.J. i./90,287; ii./90,201); (3) by the exhibition of the official **Thyroid Solution** by the mouth or hypodermically; (4) by **Dry Thyroid** in powders, cachets or tablets. Success has been most notable in cases of myxœdema in which prolonged treatment is necessary; obese and insane persons and weak-minded children have also improved under its use.

The action, on administration of thyroid gland preparations, is (1) a stimulating one—metabolism is increased by a process of katalysis; and (2) the production, by means of the parathyroid tissue present when sheep's gland is used, of a substance which has the effect of neutralising the toxic results of this metabolism.

It should be noted that the Thyroid preparations on the market (mostly made from sheep's thyroids) are obtained from parathyroid as well as thyroid tissues; deficiences, therefore, in both these glands in man are met by feeding with these preparations. Signs of thyroidism must be carefully watched for during administration of Thyroid preparations.

Historical review of Thyroid gland treatment of myxœdema and cretinism. The original case of myxœdema first treated (hypodermically) years ago (by Murray) with Liquor Thyroidei enjoyed health by taking 10 minims of the Liquor each day—6½ ounces in the course of the year—less than a gallon in 22 years. As to other uses of Thyroid, the marked emaciation caused by excessive secretion in exophthalmic goitre indicates its employment in obesity—in some cases good results—with adequate diet. Also sometimes valuable in rickets, rheumatoid arthritis and nocturnal enuresis. As it improves the skin in myxœdema it has been used in psoriasis and other cutaneous diseases.—G. R. Murray, B.M.J. ii./13,163; L. ii./13,201. Murray's patient took Thyroid for 28 years. Atrophy of the thyroid need not shorten life provided this substitution treatment be fully maintained.—B.M.J. i./20,359.

In exophthalmic goitre Thyroid is totally ***unsuited***—it aggravates the condition. *cf.* Potassium Iodide. Arsenic and Ergot internally with iodine locally reduced the swelling in a case but it returned, subsequently surgical measures produced good effect.—L. i./11,735.

Use of Suprarenal gland is successful, *v.p.* 959.

Myxœdema, on the other hand, is speedily improved by Thyroid and a more or less complete cure is established. 'The results,' says Osler, 'are unpar-

alleled by anything in the whole range of curative measures. Within a few weeks a poor feeble-minded toad-like caricature of humanity may be restored to mental and bodily health.'

V. Horsley had previously to Murray's work practised transplantation of sheep's thyroid gland into the tissues of a myxœdematous patient. Later McKenzie showed internal use of Thyroid preparations equally good.

The patient must continue to take the preparation more or less all his life.

Over-doses of Thyroid preparations may cause rapid pulse, 'racing' of the heart, feverishness, headache, pruritus, and even delirium. Chronic thyroid poisoning has also been observed—the symptoms being emaciation, muscular weakness, loss of hair, dilated pupils, and general debility.

Thyroid, Excessive use of (Police Court Case).—L.i./12,751.

Thyroxin.—*Dose.*—For an adult case of myxœdema about 1½ to 2 mgr. is given *per os;* normally an individual cannot take more than 2 mgr. a day continuously without developing signs of hyperthyroidism. This name has been given to an active principle which is present in very small quantity—1 Gm. per 100 kilos of fresh glands. It is described as 4 : 5 : 6-hydro-4 : 5 : 6-iodo-2-oxy-β-indol-propionic acid of the empirical formula $C_{11}H_{10}NO_3I_3$, *i.e.*, it contains about 65% Iodine. It has been found that during the months of January, February and March the glands contain only a slight percentage. During the summer the increase is 400%. For method of extraction *see* E. C. Kendall, Jl. Biol. Chemistry, Vol. XXXIX. (Abst. C and D, March 27, 1920, p. 404.)

J. Huxley at Oxford has given out the results of the experiments with a preparation of this kind and has stated that low forms of life, *e.g.* tadpoles under treatment with it, develop to the adult stage with greater rapidity than those without it. It might be utilised, the speculation goes, in influencing the sex of the offspring in man.

Thyroxin being an Iodine derivative of **Tryptophane,** a substance normally present in the circulating blood as a product of protein digestion, there is a constant supply of raw material for its manufacture. In hyperthyroidism there is over-production and an abnormally high catabolism—the action of Thyroxin as a catalyst increases tissue destruction.—Pres., Oct., 1922, 311,334.

Only about 20 Gm. can be got from 3 or 4 tons of Thyroid Gland.—P.J. i/22,266.

Thyroxin Tablets are available of strength 0·2, 0·4, 0·8, and 2 mgr. To be completely dissolved in water for use.

For *intravenous use* **Thyroxin Crystals** are dissolved with aid of a drop of 10% Sodium Hydroxide Solution in 1 cc. of water. *Dose* from 1 to 10 mgr. The amount is determined by the basal metabolic rate. 1 mgr. increases the rate of an average adult 2%. With a myxœdema patient the maximum effect is produced on the tenth day after a single injection.

Caution.—The action of Thyroxin persists for about 15 days. Wait until effect has passed off before giving a fresh injection.

The Thyroxin of commerce is said to be the Sodium Salt of partially purified Thyroxin. *See also Tests for Thyroid acitivity,* p. 973.

For a full description of Thyroxin, see Pres., Mar./21,171.

Liquor Thyroidei, THYROID SOLUTION (B.P. 1898).

Dose.—5 to 15 minims (**1·3 to 1 Cc.**), freshly prepared. 100 minims represent one entire gland.

It is better to add glycerin 15 to 20 of the sliced and bruised tissue, macerate 24 hours, press, and make up to the required volume with glycerin and water *partes æquales.* Mixtures should be prescribed with Chloroform Water.

It was a mistake to de-officialise this. It is a convenient mode of taking. During the war it was unavailable and patients had to be put on dried gland. They preferred to go back to the Liquor when it became available again.—W. Martin, P.J. i./23,233.

Flavoring.—Glyl or Syl Aurantii Floris, Glyl or Syl Amygdalæ Amaræ; Syrupus Limonis.

Assay.—The author suggests Standardisation with a content of **0·025 Gm.** *organically combined Iodine per* 100 *Cc., vide Vol. II.*

Hypodermic and Intravenous] Injection of Thyroid Preparations.

Our experiments showed that Liquor Thyroidei B.P. *even with* the addition of 0·5% Phenol is not sterile. Further work showed that spores were not killed by boiling for ½ hour in sealed ampoules, but a temperature of 120° C. for ½ hour in the autoclave was sufficient to kill all bacteria.

This treatment causes coagulation of the albuminoid constituents and in all probability is injurious to the active thyroid principle.

Finally, experiments were made by the method of partial or intermittent sterilisation at 60° C. for ½ hour for 10 successive days. In this case gelatinisation was less pronounced, but even this preparation was *not sterile*. The only thing to do is to filter through a sterilised porous clay, but it is conceivable this may to some extent remove the active principle.—W. H. M., Expts., Nov. 1920.

Thyroideum Siccum, Dry Thyroid (*Off.* and B.P. '98).

Dose.—½ to 4 grains (**0·03 to 0·25 Gm.**), in cachets.

Should not exceed 15 grains daily.—W. W. W.

Prepared from healthy fresh glands of sheep; the surrounding fat, etc., is first removed; the glands are finely powdered after drying at not exceeding 40° C.; and finally the substance is freed from fat by Ether percolation. (One part equals about 5 of fresh gland.)

Relation between doses of Liquor Thyroidei and Thyroideum Siccum.

N. H. Martin pointed out that:—

5 to 15 minims of Liquor Thyroidei = 2½ to 7 grains of fresh gland,

3 to 10 grains of Thyroideum Siccum = 11 to 35 grains of fresh gland,

and, therefore, that the dose of Dry Thyroid is about five times too strong in proportion to that of liquor. If reckoned on iodine content the dose of dried thyroid is about ten times too strong in proportion.—P.J. ii./12,145.

Assay.—The author standardises this preparation to 0·2% *Iodine in organic combination.* U.S. has this as average, P. Belg., 0·03%. *For details see Vol. II.*

In many samples examined the Iodine content rarely, if ever, fell below 0·25% for Thyroideum Siccum.—W. Martin, P.J. i./23,233.

Thyroid "Extract" is an unfortunate name to indicate Thyroideum Siccum (*Off.*). The fresh glands basis also introduces grave misunderstanding. Myxœdema, a case did no good with a course on the latter basis but when dosage of Thyroideum Siccum was given there was improvement at once.—A. E. Carver, B.M.J. ii./17,515. W. H. Martindale, in support of this letter draws attention to the necessity of standardising Thyroideum Siccum.—*Ibid.* 570. See also A. Goodall, B.M.J., i./14,1351.

Standardised Thyroid Tablets, 1½ and 5 grains (**0·1 and 0·3 Gm.**).

(*We discard the old fresh substance basis for Thyroid Tablets as being unscientific and misleading.*)

A confusing letter on Thyroid dosage by Professor Dixon. It is stated that the dose in tablet form is weighed as fresh gland—this is of course not the case.—B.M.J. ii./22,948.

***Thyroglandlin.** (T.M. 279798), is a trade brand of dry Thyroid. *Dose.*—3 to 5 grains.

'Four Gland' Tablets. *Syn.* Compound Thyroid Tablets. *Martindale. Dose.*—One or two twice daily for adults,—young children in proportion.

These Tablets contain 1 grain each of Thyroid, Thymus, Suprarenal and Pituitary Gland substance.

A treatment in mental and physical deficiency based on the therapeutic action of the internal secretions—the *combined action*

of the internal secretions is aimed at. Correlated action in various diseased conditions between the thyroid and thymus gland, the suprarenal gland and the pituitary gland, etc., is proved also between the thymus and the suprarenals and testicle and ovary, also between the suprarenal, pancreas and pituitary and so on. In short, physical, mental and metabolic changes occur as result of interference with the internal secretion of nearly all the ductless glands.

The above tablets have been given in myxœdema, in cretinism and infantilism with good mental and promising general results. Active rickets improved by half a tablet twice a day. Tablets containing extracts of the pancreas, testes and ovary also suggested.—A. S. Woodwark, St. Bart.'s Hosp. Rep. Vol. XLVIII.

Sir J. Cantlie attributes puffiness in various parts of the body and associated depression in women to the open chest clothing so much on the increase. He has had excellent results in such cases with these tablets.

'Three Gland' Tablets—omitting the suprarenal gland—have also been employed on the same lines.

Elixir of 'Four Glands,' *Martindale,* is also prepared. *Dose.*—1 to 2 drachms = 1 to 2 'Four Gland' Tablets.

Elixir of 'Three Glands,' *Martindale. Dose.*—1 to 2 drachms = 1 to 2 "Three Gland" Tablets.—These Elixirs have also been employed in the same conditions as the Tablets.

For a study of the effects of the ductless glands upon development, see H. Gilford.—L. ii./13,718.

Pluriglandular Extracts.

The interrelation between all the endocrine glands is nowhere better exemplified than in the association they all seem to have with the organs of generation, the gonads. The author considers it misleading to talk of 'hyper' and 'hypo' functioning of certain glands.—L. Williams, per Pres., Oct. 2, 373.

Pluriglandular Therapy, though not approved by leaders of endocrinological thought, has been found a sound commercial proposition, which can only be accounted for by the fact that practitioners have found it to give good results.—Pres., Oct., 23,374.

In G. Y. Oliver's experience, hundreds of cases of dysmenorrhœa due to various endocrine disorders have obtained relief from a mixture of pituitary, thyroid, adrenals and gonads (Hormotone) or from treatment with the separate glands.—Pres., Dec., 23,401.

Mixed Gland Tablets, No. 1 (Male), contain Thymus Gland 2 grains, Thyroid Gland 1/5th grain, Pituitary (Anterior Lobe) ½ grain, Suprarenal Gland ¼ grain, Didymin ½ grain, Cerebrin ½ grain; **No. 2 (Female)** contain Thymus Gland 2 grains, Thyroid Gland 1/5th grain, Pituitary (Anterior Lobe) ½ grain, Suprarenal Gland ¼ grain, 'Varium' ½ grain, 'Mamos' ½ grain, Cerebrin ½ grain.

For pluriglandular therapy in instances in which it is difficult to determine which gland constituent is at fault.

***Hormotone** (T.M. 365396) is described as a combination of hormones derived from the thyroid, pituitary, ovary, testis and suprarenal glands. Each Tablet contains 1/20 grain of desiccated Thyroid and pituitary. *Dose.*—One or two tablets thrice daily before meals; not more than six per day. Stated to favour metabolism and increase mental, nerve, and muscular activity.—L. ii./13,84. **Hormotone without Post-Pituitary.** Tablets are also made for use in neurasthenia associated with high blood pressure and all hypertensive conditions.

References to Thyroid Treatment.

Iodine (first found by Baumann in 1896), and Bromine, have been found in sheep's thyroid glands.

It is worthy of note that arsenic and iodine were used in the treatment of myxœdema long before these were found in the thyroid gland.

Numberless reports of the relief of myxœdema and cretinism have been recorded. Opinion varies as to its value in obesity. Has been used successfully in lupus, psoriasis, in pityriasis rubra, ichthyosis and alopecia; and in enuresis.

Acromegaly improved.—B.M.J.E. i./96,51; L. ii./96,614.

Hæmophilia controlled by the liquor.—B.M.J. ii./00,1375.

In auto-intoxication of pregnancy and impending eclampsia. Full doses.—L. ii./03,307.

In arterio-sclerosis thyroid preparations are very useful.—B.M.J. i./06,121.

Hay fever:—1 to 3 tablets daily will benefit.—M.A., 1908, 37.

DERCUM'S DISEASE treated by 5 grain doses thrice daily. After two weeks reduced pain and alleviated numbness and tingling and reduced size of swelling.—B.M.J. ii./09,516.

Chronic subcutaneous fibrosis treated by thyroid gland (or Liquid Extract of Fucus) diabetic diet, exercise and massage. Unless the obesity can be reduced, the prospects of improvement are slight.—B.M.J. i./11,354.

In amenorrhœa a valuable drug. The function of the thyroid is (just before onset of menstruation and early in pregnancy) to stimulate calcium excretion which may take place from the uterus or failing that from kidney or bowel. —B.M.J. i./09,597. Dysmenorrhœa and even amenorrhœa are often marvellously benefited.—H. Ewan Waller, Pr., Aug., '12,279.

In rheumatoid arthritis. With mercurial inunction as adjuvant: remarkable results in a month.—B.M.J. i./10,1770; see also L. i./10,643.

Tetany following an accidental overdose—possibly due to influence on Calcium metabolism.—B.M.J. ii./10,1523.

Eczema of infants. Suggestion for use in obstinate, and where the thyroid is thought to be functioning badly—well borne even by young infants and has proved successful.—Pres., June, 1911, p. 163.

"X" Rays on thyroid glands (Rabbits),—effects.—B.M.J. i./12,28.

Eclampsia should be treated prophylactically with thyroid. Relief of giddiness, swelling and check to albuminuria pronounced.—B.M.J. i./13,1272.

The ultimate effect of the activity of the thyroid *in situ* is to raise the blood pressure, and the same result is produced by administering Thyroid. Gross misuse of Thyroid had occurred through its recommendation as a means of reducing blood pressure.—H. Ewan Waller, Pr., May, '13,881.

In skin affections, psoriasis, alopecia, ichthyosis and xerodermia of unknown origin palpate the thyroid. If the gland is smaller than usual try thyroid.—B.M.J. i./13,1037.

Dupuytren's contraction believed to be indicative of thyroid insufficiency. Thyroid gland thought to have improved cases. 1½ grains daily and in one case 163 doses were given'—K. Black. B.M.J. i./15,328.

HYPER- AND HYPO-THYROIDISM.—The thyroid gland the storehouse for Iodine—without it the gland cannot functionate properly. Tincture of Iodine in treatment better than organically combined Iodides. In mastitis the large nodular masses in the breast often readily dispersed by Thyroid, Iodine and decalcifying agents. Enlarged prostate similarly treated. An account of Albert Abrams' methods.—Sir J. Barr, Pr., June, 1921.

The part played by the endocrine glands in the evolution of man.—Prof. L. Bolk, L. ii./21,588.

Endocrine insufficiency.—The neurasthenic discomforts of the climacteric in women treated by 1/10 grain B.P. Thyroid Siccum once daily. This is safe from risk of over-dose. DEAFNESS in old people has been well treated by a small dose twice daily. Epilepsy in women also; number of fits reduced. There would appear to be some close connection between endocrine insufficiency and poisoning from intestinal absorption. The addition of an intestinal antiseptic, *e.g.*, Benzonaphthol or Calomel or Ichthyol, is useful.—F. J. Sadler, L. i./22,930.

The thyroid is the gland of creation. Has anyone ever heard of a myxœdematous artist? Crichton Miller asks again for subthyroidic creators —be it of works of art or of children. The woman of artistic ability ceases

to create works of art as soon as she is taken up with the maternal function.—B.M.J. ii./22,552.

Hypothyroidism and the 'vicious circle.' The forces of nature are often successful in breaking it. Owing, however, to the extraordinary instability of the thyroid, the reactions provoked by disease appear readily to paralyse the process of recuperation. In the case of the cretin the physician has a magic wand. In other cases the remedy is less striking, because the mischief is less apparent.—J. B. Hurry, Pr., April, 22,283.

Thyroid toleration. A patient with RAYNAUD'S DISEASE did not improve until '17 grains of thyroid gland' were given a day.—H. W. Barber, L. i./22, 453.

In tertiary syphilis good results have been obtained with Thyroxin.—G. R. Murray, Clin. Jl., Aug., 1, 23,362.

Pruritus vulvæ well treated with dried Thyroid gland obtained direct from slaughter house, 0.1 Gm. being given *per os* daily. Pruritus completely ceased after 2 weeks treatment but returned after discontinuation of treatment. 0·05 Gm. of the dried Thyroid substance daily was found to keep the pruritus at bay.—A. Bregmann, per Clin. Jl., Nov. 28, 23,575.

Position of the thyroid gland in the endocrine system—a powerful activator of metabolism. Co-operates with the adrenals and pituitary and antagonises pancreas and parathyroids.—W. Langdon Brown, B.M.J. i./22,85.

Hyperthyroidism is generally considered to be typically manifested in Graves' disease, and that many of its clinical symptoms are directly due to excess of thyroid secretion is proved by the fact that removal of portions of the Thyroid gland materially lessens or entirely eliminates the ill effects of the excess. The clinical signs of Graves' disease are not primarily all due to the increased thyroid secretion. The protruding eyeball for instance is now looked upon as the result of suprarenal excess.—H. Stanley-Jones, Pres., Oct., 1922.

Graves' disease is usually secondary to some pre-existing chronic infection. It is usually associated with dental defects, tonsil and nasopharyngeal troubles, with rheumatism and with colonic disturbance. Give Tinct. Iodi Mitis 5 minims *t.d.*—H. Ewan Waller, Pres., Oct., 1922.

The problem of hypothyroidism, concerning the signs of which a small volume might be written, is the discovery of the underlying cause.—Pres., Oct., 22,314.

Infantile or adolescent myxœdema cured by Thyroid treatment—case described.—R. Hutchison, per Clin. Jl., April 18/23,183.

The thyroid apparatus is primarily concerned in controlling the direction of protein synthesis within the body, the thymus being the reserve store of nitrogen.—G. Scott Williamson, L. ii./23,1337.

ANTE-NATAL AND POST-NATAL INFLUENCES OF THE THYROID.—The presence of a living fœtus in the uterus appears to have a direct influence in exciting the thyroid into activity. It has been called the female gland because it plays a more important part in the physiology of the female than in that of the male. A woman may show few signs of hypothyroidism in pre-married life, but when put to the larger test of pregnancy the thyroid may fail adequately to respond. A liberal supply of thyroid hormone is most essential during gestation, and, if not forthcoming, disturbances of health are inevitable—affecting the mother, or fœtus or both. These disturbances can often be lessened or relieved by administration of thyroid substance. Thyroid deficiency may result in abortion, premature labour or abnormalities of the child. The comparative difficulty of rearing male children may be due to the fact, that mothers of male children are unable to supply sufficient thyroid through their milk. Cow's milk varies in its Iodine content, and may be deficient in thyroid. Some cows persistently give a milk too low in Iodine content, and cow's milk in the summer shows a higher percentage of Iodine than in the winter. Hyperthyroidism in pregnancy, if not excessive, may be of advantage rather than otherwise. Disturbances in the thyroid function are the prelude to disorganisation of the functions of other endocrines.—H. Stanley-Jones, Pres. May, '24,180-182.

Isolation of the thyroid hormone.—Pres., May, '24,185.

Thyroid medication apparently has a regulating effect on the calcium of the organism.—B M.J. i./09,597. Theories have been promulgated to show

that types of goitre depend on the relative proportions of Calcium and Iodine in the blood.—Pres., Oct., 22,360; May, '24,186.

There is no foundation for the assumption that thyroid deficiency predisposes tuberculosis.—Coulaud, per Pres., May, '24,187.

Many cases of hyperthyroidism are diagnosed as neurasthenia and treated with tonics with little improvement. Determination of the B.M.R. will easily differentiate hyperthyroidism from other conditions.—H. W. Riggs, per Pres., May, '24,188.

Acne in young children can sometimes be referred to hyperthyroidism.—S. Covisa, per Pres., May, '24,189.

In congenital syphilis in young children thyroid medication constitutes a valuable adjunct to specific treatment.—Pres., May, '24,195.

Tests for Thyroid Activity.

Basal Metabolic Rate ***(B.M.R.)*** means the rate of energy exchange in the body as seen under basal conditions (after elimination of movement, digestion, etc.). A relatively simple way of determination (as described by Benedict, Jl. A.M.A., July 23, 1921, p. 247, and Krogh, Brit. Ass. Rep., 1921, p. 445), is to measure the oxygen consumption of the patient during a given period. Air plus oxygen is rebreathed in a closed-circuit apparatus in which the exhaled CO_2 is absorbed, the diminution in volume of the gas indicates the amount of oxygen consumed. The B.M.R. does not vary as much as 10%. In hyperthyroidism it rises to 25 or 50% above normal, or even more; while in deficiency the rate falls below normal. To maintain it at normal, 12 to 14 mgr. of Thyroxin, Boothby has calculated, must be present in the system. The Thyroxin is used up at the rate of about 0·5 mgr. a day. In a case of myxœdema this amount would have to be given daily intravenously. The equivalent of Liquor Thyroidei (B.P. '98) estimated to be 10 minims or 5 grains of fresh gland.—Pres., Oct., 22,345; May, '24,192-195; L. i./23,131; G. R. Murray, Clin. Jl., Aug. 1, 23,362.

Para-thyroid Gland.

These are four minute bodies embedded in the thyroid. Sir E. Sharpey Schafer states their internal secretion possesses hormones which exert a powerful influence on the nervous system.—B.M.J. ii./12,597.

The parathyroid glands are as essential to life as the thyroid. On experimental removal, in addition to causing tetany and death in a few days, it has been stated that the lime content in the tissues is reduced, there is increased Calcium and Nitrogen excretion, increase in amount of absolute and relative Ammonia in the urine and increase in the Ammonia content of the blood. It is also held that whilst thryoid secretion promotes metabolism parathyroid substance renders the products formed innocuous.

Some hold that the gland under discussion is simply undeveloped thyroid tissue capable of becoming functionally active in certain circumstances.—G. R. Murray.

Uses.—Parathyroid is indicated in tetany, tetany of pregnancy, epilepsy, paralysis agitans, sprue (with Calcium Lactate), eclampsia and tetany of childhood.

Desiccated Para-thyroid Gland.

Dose.—1/60 grain (**0·001 Gm.**) to 1½ grains (**0·1 Gm.**) thrice daily.

The fresh parathyroid gland weighs on an average 0·09 Gm. This yields from 0·015 to 0·02 Gm. of desiccated powder, *i.e.*, 1=5 approximately of fresh substance.

Tablets contain 1/20 grain (0·003 Gm.), 1/6 grain (0·01 Gm.), ¼ grain (0·016 Gm.), and ½ grain (0·03 Gm.) Desiccated gland.

Parathyroid contains no Iodine, and is thus distinguishable from Thyroid.—F. W. Gamble, Pres. Address B.P. Conf., 1923.

Endocrine factor in producing immunity and susceptibility of the teeth to caries. The parathyroids, *pars anterior* of the pituitary, medulla of sup-

rarenal, with possibly the thymus gland, regulate absorption and fixation of Calcium, while the gonads (ovary and testes) and possibly the thyroid, regulate excretion.—F. W. Broderick, L. ii./21,1216. See also Ovarian gland.

Paroxysmal tachycardia. Parathyroid 1/10th gr. thrice daily used with remarkable effect.—C. Dukes, B.M.J. ii./21,987.

Calcium deficiencies treated by Parathyroid.—Varicose ulcers found to improve under intramuscular injection of Calcium salts up to a point but did not proceed to complete cure; under *Parathyroid*, healing was more rapid in cases at rest and in early cases. For these ulcers 1/10th grain of dried gland was given until laboratory tests showed that the ionised Calcium had returned to normal.—W. R. Groves and H. W. C. Vines, B.M.J. ii./21,40, 152,687; L. ii./21,1383; B.M.J. i./22,791. Leucocytic activity is stimulated. —*Ibid* i./23,106.

Results tend to confirm that parathyroid glands are regulators of Calcium metabolism, and that they act upon certain toxic substances, rendering them harmless. There is little evidence to indicate a relationship between the calcium factor and the detoxicating function, but clinical results show a parallelism between the restoration of the calcium balance of the blood and improvement in general health of the patient.—H. W. C. Vines, Pres., Oct. 1922,339.

By controlling Calcium metabolism the gland influences functions not only of the muscle and nerve tissue but probably of all organs. Dog experiments. —L. i./23,665. Tetany treated by Parathyroid. Some good results have been reported.—Prof. Swale Vincent, L. i./23,130. Tetany, following removal of right lobe of thyroid gland, benefited from subcutaneous injection of parathyroid 1/10th grain doses, and large doses of Calcium Lactate.—Davies, B.M.J. i./23,512.

An inquiry from various well-known firms making thyroid preparations, as to whether parathyroid was included, elicited a variety of replies. An American firm said they had only found one man in U.S.A. who was able to locate the parathyroid and extract it for use.—H. Crichton Miller, B.M.J. ii./22,551.

It is stated that manufactures of thyroid preparations separate the parathyroid in making preparations. This is of course not the general rule at all.—W.H.M. Clinically, parathyroid medication has been found helpful in the treatment of benign ulcers, both internal and external, that is, gastric, duodenal and varicose ulcers. Useful in tetany and the condition of chronic toxæmia called latent tetany.—L. Williams, B.M.J. i./23,1010.

Parathyroid Preparations, Standardisation of by means of incubation with a known amount of ***Guanidine*** (excess of this can be shown in the blood and urine in tetany, and in animals Parathyroidectomised).—H. W. C. Vines, B.M.J. ii./23,559. *See also Vol. II.*

Parathyroid 1/10 grain twice daily, in conjunction with Calcium Lactate 10 grains 3 times daily, has been found to give excellent results in sprue.—H. Harold Scott, L. ii./23,876. *See also* Sprue, *Vol. II.*

Parathyroidectomised dogs can be kept alive without symptoms of tetany by diets containing (1) large amounts of lactose or (2) large amounts of Calcium salts. Parathyroid tetany considered to be due to an intoxication for which the proteolytic group of intestinal bacteria are responsible. The function of the parathyroid glands is to prevent intoxication by these poisons. These glands do not furnish a hormone necessary for life.—Pres,. May, '24,199.

Several workers have submitted evidence of a relation between the parathyroid and the pancreas.—Pres., May, '24,200.

In view of the Calcium loss, characteristic of tuberculosis, it is suggested. that parathyroid therapy should be a reasonable addition to the treatment of that disease.—Pres., May, '24,202.

Psoriasis treated by Parathyroid 1/10 grain once daily.—B.M.J. i./24,772.

Thyroidectin. *Dose.*—5 grains in capsules. The dried blood of thyroidectomised animals.

Has been given in Graves' disease on the theory that the serum of such animals contains substances which would neutralise the excessive formation of thyroid. **Thyroidectomised Goat's Milk** has also been used.

BLOOD TRANSFUSION.

The revival of this operation is due to the brilliant results achieved in the war. It enables loss of oxygen carriers and blood volume to be replaced.

In seriously ill persons, before an operation, the administration of 200 or 300 Cc. of blood might entirely alter any possible end-result of surgical interference, and the mortality of influenza and pneumonia in epidemic form might be lessened. Its use in blood diseases, hæmophilia, purpura hæmorrhagica, is also obvious. Catastrophies showed however that there is an incompatibility of bloods of certain individuals. Two such incompatibles cannot act as '*donor*' and '*recipient*' respectively.

Landsteiner's Law of iso-agglutinins was the outcome. There are present in human blood two agglutinable substances, A and B, which react with specific agglutinins, *a* and *b*. If any blood contains an agglutinable substance, it will contain the agglutinin which reacts with the alternative agglutinable substance. Blood which contains A will contain *b* agglutinin and *vice versa*.

In consequence of further English and American work, numbers are used. Thus, Group II. possesses the agglutinable substance A and agglutinin *b*, Group III. the agglutinable substance B and agglutinin *a*, Group IV. has both agglutinins but no agglutinable substance, and Group I. has both agglutinable substances A and B but neither agglutinin.

Landsteiner's Law may therefore be shortly stated: "In any blood there are always present agglutinins against the agglutinable substances absent from the same blood."

With samples of serum from known Groups II. and III. it is possible to test quickly any blood, and before a transfusion this has to be done. For practical purposes the **corpuscles of the donor should not be agglutinated by the recipient's serum,** for although theoretically the donor's serum may agglutinate the recipient's corpuscles this serum is so largely diluted that this does not prove any great danger and need not be considered.

Since the corpuscles of Group IV. are agglutinated by no serum of any other group, the members of this group are called 'Universal donors,' and generally a Group IV. blood is chosen for transfusion if possible.

Directions for testing.—Into a small test tube such as is used for the Wassermann reaction is placed a small quantity of N/10 sodium citrate in normal saline, and four or five large drops of blood, obtained by pricking the finger, are mixed with this citrate solution, giving an emulsion of red blood corpuscles. On to one end of a microscope slide is placed a drop of serum from a Group II. blood, and on to the other end of the slide a drop of Group III. serum, to each of which is then added a little of the corpuscle emulsion, each mixture being stirred with a smooth glass rod and the slide gently rocked to and fro. If agglutination occurs, it is quickly and unmistakably visible to the naked eye, and appears as a fine deposit resembling brick-dust, the particles of which often gradually get larger as more corpuscles are agglutinated until in some cases there appear a few crimson dots floating in clear serum.

Donors should be healthy males between 30 and 40. Syphilis, malaria, filariasis, acute rheumatism, trench fever, pneumonia, cerebro-spinal fever and typhoid should be excluded; albuminuria, cardiac delibity and marked obesity would exclude the donor on grounds of danger to himself. The amount transfused is, on an average, 500 Cc. It is citrated to the extent of 1% with sodium citrate at the time. A wide mouthed bottle, graduated to 800 Cc. with fittings may be used.—E. F. Skinner, B.M.J. i./23,750.

Alternative procedure.—Some blood is taken into a pipette from the recipient and centrifugalized to separate the clot. A few drops of the donor's blood are taken into a 1·5% solution of Sodium Citrate and shaken up. A drop of the serum is mixed with a drop of the corpuscular emulsion on a slide and a cover glass placed on it, the result being watched under low power. If no agglutination occurs in 5 minutes the donor's blood is suitable. No need to determine the group of either.—S Wyard, Clin. Jl., May 2/23,206.

Selection of blood donors for transfusion. Lists of 'Universal Donors' kept in many hospitals for emergency.—H. Wallace Jones, Pr., Mar., 1921. Blood grouping and its clinical applications. May later have medico-legal aspect.—S. C. Dyke, L. i./22,579. *Malignancy and blood grouping.*—All four groups liable to malignant disease, but groups 1 and 3 peculiarly susceptible.—M.P.C., Nov./22,301; Brit. Jour. Exper. Path., 1921, Vol. 2, p. 66. Bladder tumour operation. Blood transfused by the citrate method. Result satisfactory.—F. Kidd, L. i./23,585.

TABLE OF INFECTIOUS DISEASES.

Disease.	Incubation.	Quarantine.	Isolation of the Infected.
Varicella (Chickenpox)	11 to 19 days.	20 days.	Until every scab has fallen off particular attention being paid to the scalp. *See* also Therap. Ind.
Diphtheria.	2 to 10 days.	⇉	When a bacteriological examination of the throat and nasal mucus has been carried out with negative results on three successive occasions at intervals of two days —no antiseptic applications having been made to the throat and nose for at least three hours before taking the swab (*Quarantine*). In no case for less than four weeks, and until convalescence is completed, so that there is no longer any sore throat, or any abnormal discharge from the throat, nose, ears, or eyes, no cutaneous pustulation and no albuminuria and that at least two successive bacteriological examinations of the pharyngeal and nasal mucus for the specific bacillus, made at intervals of not less than 2 days have been negative; each examination having been made not less than three hours after the discontinuance of local applications (*Isolation*).
Influenza	41 to 45 hrs	——	
Rubella (German Measles)	9 to 18 days.	20 days.	For not less than seven days from the date of the appearance of the rash provided there is no persistence of nasal or other symptoms.
Epidemic Roseola.	9 to 18 days.	20	Evidence strongly against the conveyance of infection by the air.—F. H. Thornton L. i./16,342.
Morbilli (Measles).	10 to 14 days.	16 ,,	For not less than two weeks from the date of the appearance of the rash, convalescence being satisfactorily established. Revision of Notification. Regulations as at January 1/16. The head of the family and the medical practitioner to notify. The former requirement is a dead letter.—B.M.J. i./16,205.
Mumps.	14 to 23 days.	24 ,	For not less than two weeks from the commencement—provided that one clear week has elapsed since the complete subsidence of all swelling.
Scarlatina (Scarlet Fever)	2 to 5 days.	10	For not less than four weeks from the date of the appearance of the rash, provided convalescence is completed, and there is no sore throat, discharge from the ear or nose, suppurating or recently enlarged glands, or eczematous patches.
Variola (Smallpox).	10 to 14 days.	16 ,,	Until every scab has fallen off, and the skin lesions have all healed.
Typhoid Fever	7 to 21 dys.	23 ,,	——
Typhus.	5 to 14 dys.	14 ,,	4 weeks.
Whooping Cough.	7 to 19 days.	21 ,,	Until the characteristic spasmodic cough and the whooping have ceased for at least two weeks, or in cases of persistent whooping in not less than six weeks from the commencement of the spasmodic cough.
Ringworm.	—	——	When the whole scalp, having been examined, not one broken off hair showing any of the forms of ringworm fungus is to be detected on microscopic examination.

Notification of pulmonary tuberculosis (see also p. 914) not popular with the public, nor with some of the profession—pre-
ferable notify as suspect only at first R. Dodgild, B.M.J. i.: (

POISONS.

The pharmacist has frequently to supply poisons and 'poisonous' substances—the latter being differentiated in their legal significance *cf.*p. 979,—without a medical man's prescription. In view of the exacting nature of the **Poisons and Pharmacy Act, 1908** (8 Edw. 7, ch. 55), which came into force April 1, 1909, it is of importance to be able to determine the position of any poison in the Schedule thereto, which is in two parts. We provide the Schedule below and some further details of the Act. As in past Editions we show Part I. Poisons by means of the sign [P1] and those in Part II. by means of the sign Ⓟ. These signs precede the names of the poisons,—once, as a general rule, under its main heading.

In spite of the recent misuses of Cocaine,—many of the reports being grossly exaggerated, we would again point out that the equally dangerous **Cocaine Substitutes** remain completely *unrestricted.* They are, as yet, not touched by the Dangerous Drugs Acts (*q.v.*).

These drugs frequently find mention in the columns of the daily press. As a further criticism, Mercuric Chloride cannot be bought by the public except under [P1] restrictions, but any quantity of aqueous solution (an ounce will dissolve in a pint) can be legally obtained as a Ⓟ poison.

Needless to say, though the existing legal restrictions may be insufficient in small particulars, ***pharmacists are fully alive*** to the necessity of guarding against misuse of poisons, *which they alone are permitted to sell in open shop.* In determining whether an alkaloid is a poison or not, we take the dose and the uses in each case into consideration; there are exceedingly few which are in any way on the borderline between poison and non-poison.

Local authorities who licence persons other than legally qualified chemists, to sell "**Poisonous substances used exclusively in agriculture or horticulture**" should realise the seriousness of the duty entrusted to them. Facilities are granted for more easily obtaining arsenic and nicotine. Safeguards are provided in connexion with mineral acids and soluble salts of oxalic acid—to be labelled "Poisonous." Since 1880 over 1,000 companies had been formed carrying on the business of Chemists and Druggists —many of them by persons who had failed to qualify. According to the new Act a body corporate, or in Scotland a firm or partnership, may carry on the business of Chemist and Druggist if the business is **under the control of a superintendent who is duly qualified.** Certificate of qualification of bona fide superintendent must be exhibited in the shop. The word Pharmacist can be used by Chemists and Druggists but not by companies.—L. i./09,849,937.

At a meeting of the B.M.A., before which Sir William Willcox read a paper urging the need of more stringent control, it was resolved that the *sale of Arsenical preparations,* included in Section II. of the Poisons and Pharmacy Act 1908 (*i.e., in the Schedule of Poisons*), should be limited (1) on the part of the seller to properly qualified and competent *pharmacists,* and (2) on the part of the purchaser *to those who had obtained a licence* for the possession of such dangerous articles.—B.M.J. ii./22,374; P.J. ii./22,127.

SCHEDULE OF POISONS.

APPLICABLE TO GREAT BRITAIN.

(*Under the Poisons and Pharmacy Acts as amended up to June* 24, 1924.

PART I. (marked [P1] in our text.)

Not to be sold by retail unless the purchaser is known to, or introduced by some person known to, the seller who must be a registered Chemist and Druggist or registered medical practitioner; also *before delivery of the poison* entry to be made in poison-book of (1) date of sale, (2) name and address of purchaser, (3) name and quantity of article, (4) purpose for which it is wanted—attested by signature of buyer and if necessary of the person introducing him; and must be labelled with (1) name of article, (2) the word "Poison," (3) name and address of seller. *See also* Regulations *re* bottles, etc., p. 980.

Aconite, Aconitine and their preparations.

Alkaloids.—All poisonous vegetable alkaloids not specifically named in this schedule and their salts, and all poisonous derivatives of vegetable alkaloids.

Arsenic, and its medicinal preparations. (See also Arsenic Act.)

Atropine, and its salts, and their preparations.

Belladonna, and all preparations or admixtures (except belladonna plasters), containing 0·1 or more per cent. of belladonna alkaloids.

Cantharides and its poisonous derivatives.

***Coca,** any preparation or admixture of, containing 0·1 or more per cent. of coca alkaloids. (*From January* 3, 1921).

Corrosive Sublimate.

Cyanide of Potassium and all poisonous cyanides and their preparations.

***Diamorphine** (also known as **Heroin**), and all preparations or admixtures containing 0·1 per cent. or more of diamorphine. (*Added January* 3, 1921.)

Diethyl-Barbituric Acid and other alkyl, aryl, or metallic derivatives of Barbituric Acid, whether described as Veronal, Proponal, Medinal, or by any other trade name, mark, or designation, and all poisonous **Urethanes** and **Ureides.** (*These were transferred from Part II. to Part I. in* 1918).

***Ecgonine,** and all preparations and admixtures containing 0·1 per cent. or more of ecgonine. (*Added January* 3, 1921.)

Emetic Tartar, and all preparations or admixtures containing 1 or more per cent. of Emetic Tartar.

Ergot of Rye and preparations of ergots.

Lead, in combination with Oleic Acid, or other higher fatty acids, whether sold as Diachylon or under any other designation (*except* machine-made Plasters). (*Added May 27th,* 1917.)

Nux Vomica, and all preparations or admixtures containing 0·2 or more per cent. of **Strychnine.**

***Opium,** and all preparations or admixtures, containing 0·2 or more per cent. of morphine. (*Altered Jan.* 3, 1921.) **TINCTURA OPII (LAUDANUM)** *Off.* is 1%.

Picrotoxin.

Prussic Acid and all preparations or admixtures containing 0·1 or more per cent. of Prussic Acid.

Savin and its oil, and all preparations or admixtures containing Savin or its oil.

PART II. (marked Ⓟ in our text.)

Must be labelled with (1) name of article, (2) the word "Poison," (3) name and address of seller who must be a registered Chemist and Druggist.

Almonds, Essential Oil of (unless deprived of prussic acid).

Antimonial Wine.

Cantharides, tincture and all vesicating liquid preparations or admixtures of.

Carbolic Acid, and liquid preparations of, and its homologues containing more than 3% of those substances, *except* preparations for use as sheep-wash or for any other purpose in connection with agriculture or horticulture contained in a closed vessel distinctly labelled with the word "Poisonous," the name and address of the seller, and a notice of the agricultural or horticultural purposes for which the preparations are intended. (For Order in Council *re* Liquid preparations containing not more than 3% of Phenols, see page 979.)

Chloral Hydrate.

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* *See also Dangerous Drugs Acts.*

Chloroform and all preparations or admixtures containing more than 20% f chloroform.
Digitalis.
Mercuric Iodide.
Mercuric Sulphocyanide.
Oxalic Acid.
Poppies, all preparations of, excepting red poppy petals and syrup of red oppies (*Papaver rhœas*).
Precipitate, Red, and all oxides of Mercury.
Precipitate, White.
Strophanthus.
Sulphonal and its homologues, whether described as Trional, Tetronal, r by any other trade mark, name, or designation. (*Added April* 14, 1913.)
Zinc Chloride and liquid preparations of zinc chloride, *except* preparations ntended for soldering, or other purely industrial purpose, provided that ney are contained in closed vessels labelled with the word "Poisonous" nd bearing the name and address of the seller and a notice of the special urpose for which the preparations are intended. (*Added January* 3, 1921.)
All preparations or admixtures *which are not included in Part I. of his Schedule, and contain a poison within the meaning of the Pharmacy Acts,* xcept preparations or admixtures the exclusion of which from this schedule indicated by the words therein relating to carbolic acid, chloroform, and oca, and except such substances as come within the provisions of Section of this Act.

Note.—The last paragraph in the Schedule brings into Part II. many preparations and admixtures not defined in the Schedule—in particular preparations and admixtures of vegetable drugs containing poisonous vegetable alkaloids should be borne in mind even though the drugs themselves are not in the Schedule. All such preparations are clearly indicated in our pages with the letter Ⓟ. *Reference should be made to the body of the book in cases of doubt.*

ORDERS IN COUNCIL.

The Mineral Acids and Disinfectants.

Hydrochloric, Nitric and Sulphuric Acids.
Soluble Salts of Oxalic Acid.
Liquid Preparations containing more than 5% by weight of free Ammonia.
All Liquid Preparations sold as Carbolic, Carbolic Acid, Carbolic Substitutes, or Carbolic Disinfectant, containing not more than 3% of Phenols.

For each of these Poisonous substances see the body of the book
These substances when sold by retail must be labelled:

(1). *With the name of the substance.*
(2). *"Poisonous" (not "Poison.").*
(3). *"Not to be taken."*
(4). *With the name and address of the seller, and any of them in liquid form must be in a bottle distinguishable by touch.*

The wording of the Order, it will be observed, specifies 'Phenols' whereas the wording in the Schedule of Poisons (Part II.) is CARBOLIC ACID *and its* HOMOLOGUES. *Enquiry officially showed that this wording is intended to apply also to* **Phenoloids** *where the word 'Phenols' is used.*

Agricultural and Horticultural Poisons.

By Order in Council of March 24th, 1911, *as regards Great Britain, and o August 12th*, 1912, *as regards Ireland*, **all retail vendors** *of the substanc mentioned in* **Section 2**, *Sheep dips, etc., containing* **Arsenic, Tobacc or Alkaloids of Tobacco,** *must observe the following regulations* :— **Agricultural and Horticultural Poisons**—(1) *In the sale by reta of any substance to which Section 5 of the Poisons and Pharmacy Acts* 1908 *applies the label required by the said section to be affixed to the box, bottle, vesse wrapper, or container in which the substance is contained shall bear distinct printed thereon the additional words "Not to be taken."*

(2) *In the sale by retail of any liquid substance to which Section 5 applie such substance shall not be delivered or sent out except in bottles or other containe rendered distinguishable by touch from ordinary bottles or containers.*

Licensed Persons, *as distinct from registered chemists and druggists, mu also comply with stringent regulations.*

The following has been in force since October 13, 1920 :—*A poisonou substance shall not be sold except in an enclosed vessel or receptacle as receive from the manufacturer, which vessel or receptacle must be of sufficient strengt to withstand rough usage, securely closed and free from leakage, and distinct labelled with the name of the substance and the word "Poison," and with th name and address of the seller, as provided by Section 17 of the Pharmacy Ac* 1868, *and also with a notice of the special purpose for which it has been prepare For the purposes of this Regulation the person on whose behalf any sale is mad shall be deemed to be the seller.*

No Ferrocyanide or Sulphocyanide excepting Mercuric Sulphocyanide is poison under the Act.—P.J. ii./07,640.

Regulations for the Keeping, Dispensing, and Selling of Poisons in Great Britain.

(*Prescribed by the Pharmaceutical Society and approved by the Privy Counc* These regulations, therefore, form part of the 1868 Act in pursuance of Se tion 1 of the Act.)

1. That in the keeping of poison each bottle, vessel, box, or package co taining a poison be labelled with the name of the article, and also with som distinctive mark indicating that it contains poison.

2. Also that in the keeping of poisons each poison be kept on *one or oth* of the following systems, viz. :—

(*a*) In a bottle or vessel tied over, capped, locked, or otherwise secured a manner different from that in which bottles or vessels containi ordinary articles are secured in the same warehouse, shop or d pensary ; or

(*b*) In a bottle or vessel rendered distinguishable by touch from the bott or vessels in which ordinary articles are kept in the same warehou shop, or dispensary ; or

(*c*) In a bottle, vessel, box, or package kept in a room or cupboard set apa for dangerous articles.

3.—That in the dispensing and selling of poisons all liniments, embroc tions, lotions, and liquid disinfectants containing poison be sent out in bott rendered distinguishable by touch from ordinary medicine bottles, and th there also be affixed to each bottle (in addition to the name of the article a to any particular instructions for its use) a label giving notice that the co tents of the bottle are not to be taken internally.

WHOLESALE TRADING.

Wholesale trading is exempt from the provisions of Sections I.—XV. of t Pharmacy Act, 1868, *to which reference must be made.*

Attention is specially drawn to Section 17 *of the Act* :—

"*It shall be unlawful to sell any poison* **either by wholesale retail** *unless the box* (*etc.*) *is labelled with the name of the article and t word Poison and name and address of Seller . . . but the provisions this Section shall not apply to Sales* **by wholesale dealers to reta dealers** *in the ordinary course of wholesale dealing.*"

SALES TO MEDICAL MEN.

These are now governed by Section 3 of the 1923 Dangerous Drugs Act, *q.v.*

[P1] POISONS THROUGH THE POST

to Medical Men, etc.

This matter, which, in the past, has caused pharmacists grave misgivings is now amply dealt with by the 'Amendment as to Dealing with Medical Men in [P1] Poisons in general' in Section 3 of the Dangerous Drugs and Poisons (Amendment) Act, 1923, see page 992, to which careful reference should be made.

SALE OF ARSENIC.

(*Applicable to Great Britain and Ireland.*)

On every sale of Arsenic, *in addition* to the requirements of the Poisons and Pharmacy Act, 1908 ***(see Poisons Schedule),*** the following provisions of the Arsenic Act (1851) are to be observed. Particulars of sale to be entered in a book by the seller as follows:—

Date of Sale.	Name and Surname of Purchaser.	Purchaser's place of abode.	Condition or Occupation.	Quantity of Arsenic sold.	Purpose for which required.

(Purchaser's signature.) (Witness.) (Seller's Signature.)

Or if purchaser cannot write, seller to put the words "cannot write."

No person shall sell Arsenic to any person who is unknown to the person selling such Arsenic, unless the sale be made in the presence of a witness who is known to the person selling the Arsenic, and to whom the purchaser is known, and who signs his name, together with his address, to such entries before the delivery of the Arsenic to the purchaser, and no person shall sell Arsenic to anyone under full age.

The Arsenic if colourless ***must be coloured with*** at least $\frac{1}{16}$ of its weight of ***Indigo or Soot,*** unless sold in a quantity of not less than 10 lbs. and for a purpose (*not* for use in agriculture) for which such admixture would render it unfit.

The penalty for offending against the Act is a fine of not exceeding £20.

The Act is not to prevent sale of Arsenic in medicine under a prescription of a legally qualified medical practitioner.

"Arsenic" includes ***Arsenious and Arsenic Compounds,*** and all other colourless preparations of same.

PROPOSED ADDITIONS TO SCHEDULE.

(*Resolution of Pharmaceutical Society, Aug.* 5,24.—*P.J. ii.*/24,194,200.)

1. To omit the word ***"medicinal"*** from the words "arsenic and its medicinal preparations" in Part I.

2. To omit the word ***"vegetable"*** from the description of "alkaloids and all poisons derivatives of alkaloids" in Part I. (This would bring in Synthetic Alkaloids.)

3. To add to Part I. ***Cannabis*** (the dried flowering or fruiting tops of the pistillate plant of *C. sativa*) and the resins made therefrom. ***Digitalin*** and all other poisonous constituents of Digitalis, ***Strophanthin*** and all other poisonous constituents of Strophanthus. ***Tobacco***: any preparations or admixtures of (other than tobacco prepared for smoking and snuff) containing the ***poisonous alkaloids*** of tobacco.

4. To add to Part II. Barium, Salts of, except Barium Sulphate.

5. To substitute for the preparations or admixtures clause:—

"All preparations or admixtures which are not included in Part I. of this Schedule and contain a poison within the meaning of the Pharmacy Acts, except tobacco prepared for smoking and snuff, machine-spread lead plasters, preparations or admixtures, the exclusion of which from this Schedule is indicated by the words therein relating to carbolic acid and chloroform, and except such substances as come within the provisions of Section 5 of the Poisons and Pharmacy Act, 1908."

APPLICABLE TO IRELAND.

[*In accordance with the Sale of Poisons (Ireland) Act*, 1870, *and Amendments by Orders in Council.*]

Sales may only be made by registered druggists (all registered under the Pharmacy Act (Ireland) 1875, and the Amendment Act (1890) and by persons qualified under the Poisons and Pharmacy Act, the conditions of sale being similar.

PART I.

Aconite and its preparations. Alkaloids,—see Strychnine.
Arsenic and its preparations. **Cantharides.**
***Coca,** any preparation or admixture of, containing 1 *or more* per cent. of coca alkaloids (*Added Dec.* 8, 1921.)
Corrosive Sublimate.
Cyanide of Potassium and all metallic cyanides.
***Diamorphine** (also known as heroin) and all preparations or admixtures containing 0·1 per cent. of diamorphine. (*Added Dec.* 8, 1921.)
***Ecgonine** and all preparations or admixtures containing 0·1 per cent. of ecgonine (*Added Dec.* 8, 1921.)
Emetic Tartar. Ergot of Rye and its preparations.
***Opium,** and all preparations or admixtures containing 0·2 or more per cent. of ***Morphine.** (*Added Dec.* 8, 1921.)
Prussic Acid. Savin and its oil.
Strychnine and all poisonous vegetable alkaloids and their salts.

PART II.

Almonds, Essential Oil of, unless deprived of its prussic acid.
Ammoniated Mercury.
Belladonna and its preparations.
Cantharides, the tincture and all vesicating liquid preparations of.
Chloral Hydrate and all its preparations. **Chloroform.**
Corrosive Sublimate, Preparations of.
Diethylbarbituric Acid and other alkyl, aryl, or metallic derivatives of barbituric acid, whether described as Veronal, Proponal, Medinal or by any other trade name, mark or designation; and all poisonous urethanes and ureides. (*Added July*, 1914.)
Ether, Sulphuric.
Mercury, Red Oxide of. Mercury, Biniodide of.
Morphine, Preparations of.
Nux Vomica and its preparations.
Opium and all preparations of opium or **poppies.**
Oxalic Acid and all **oxalates.**
Phenol, commonly called carbolic acid.
Phosphorus and all preparations containing it in a free state.
Strychnine, Preparations of.
Every Compound containing any of the poisons mentioned in this Schedule when prepared or sold for the destruction of vermin.

As regards the sale of Agricultural and Horticultural Poisons and Soluble Oxalates—*vide* Arsenic, p. 190, *vide* also Acid Hydrochloric, p. 48, Acid Nitric, p. 72, Acid Sulphuric, p. 103, Acid Oxalic, p. 73, and Ammonia, p. 159, *vide* also Orders in Council, p. 979, 980.

'Known to the seller.'—The knowledge should be sufficient to enable the seller to judge of the accuracy of the name and address which the purchaser gives, or to give the authorities sufficient data to enable them to identify the purchaser. (Quoted from Glyn-Jones 'The Law of Poisons and Pharmacy,' *re* Potassium Cyanide refused to be supplied to a medical man to kill wasps). —P.J. ii./22,276, Medical Press, Sept. 6th, 1922.

Colouring of poisons.—Distinctive colours for each suggested.—F. A. Hocking, P.J. ii./22,349,598.

COCAINE IN DENTISTRY.

The temporary Regulations for the use of Cocaine preparations in dentistry we gave at length in our last edn., p. 951. The position is now fully covered by the Dangerous Drugs Acts (*q.v.*) and the Dentists Act, 1921.

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* *These also apply to Dangerous Drugs Acts in respect of Northern Ireland.*

DANGEROUS DRUGS ACT—1920.

(10 & 11 GEO. V,, CHAPTER 46.)

Came into operation September 1st, 1920 (*but the Regulations only came into force September 1st,* 1921.)

Salient points from the 1923 *Act are incorporated where necessary.*

℔ *Throughout our pages means drugs or preparations coming within the provisions of these Acts.*

PART I.—*Sections* 1 *to* 3 relate to Importation and Exportation of Raw **Opium.** *Section* 1.—It is unlawful to import into the United Kingdom,* except under licence into 'Approved Ports' (see Section) 15, or (*Section* 2, Sub-section 1) to export except under the same conditions. Packages must be marked in manner prescribed. (Sub-section 2.)—The Secretary of State shall attach necessary conditions to licence, where importation of raw Opium into a foreign country is prohibited or restricted. *Section* 3.—Provision is made for regulating the production of, and dealing in, raw Opium.

PART II.—Prepared Opium (*Section* 4). Import and Export *totally* and unconditionally prohibited. *Section* 5.—Any person manufacturing, selling or dealing in, or having in possession prepared Opium, being occupier of premises used for preparation of Opium for *smoking*, or sale or smoking of prepared Opium, or being concerned in managing of premises used, or having pipes or utensils, or smoking or frequenting a place used for smoking, is guilty of offence against this Act.

PART III.—Cocaine, Morphine, etc. (as detailed in Section 8). *Section* 6. —Import and Export prohibited, except under licence. *Section* 7, Sub-section 1.—Provision to be made by regulations (*vide postea*) to: Prohibit manufacture, except on licensed premises, subject to conditions specified on the licence; Manufacture, sale and distribution to be limited to persons licensed or otherwise authorised; Regulation of the issue by medical practitioners of prescriptions containing the drugs, and their dispensing. The person manufacturing (etc.), to keep books and furnish information in writing or otherwise.

Sub-section 2.—Authorisation—under this section—of persons keeping open shop under the Pharmacy Act 1868 (as amended by the Poisons and Pharmacy Act 1908) to *manufacture* at the shop, in the course of their retail business, any preparation, admixture or extract of any of the drugs, and to retail and dispense them. The Secretary of State has power to *withdraw* authorisation, in case of a conviction of an offence, after consulting the Council of the Pharmaceutical Society of Great Britain.

Sub-section 3.—Nothing herein derogates from the provisions of the Pharmacy Act 1868, as amended 1908.

Section 8, Sub-section 1.—The drugs to which this part of the Act applies are ***Morphine, Cocaine, Ecgonine,*** and ***Diamorphine*** (commonly known as ***Heroin***), and their respective salts, amd ***medicinal Opium,*** and any preparation, admixture, extract, or other substance containing ***not less than one-fifth of one per cent. (1 in 500) of anhydrous Morphine*** or ***one-tenth of one per cent. (1 in 1,000) of Cocaine, Ecgonine or Diamorphine.***

Sub-section 2.—By Order in Council this part of the Act shall apply to new derivatives of Morphine, Cocaine, or alkaloids or other drugs, in the same manner.

(The calculation of percentage is dealt with under Section 5 of the 1923 Act, *q.v.*)

PART IV.—*Section* 9, Sub-section 1.—Application of Customs Acts. The prohibited articles are included in the table of prohibitions and restrictions inwards contained in Section 42 of the Customs Consolidation Act, 1876 and the provisions of this Act relating to the prohibition of the export of articles shall have effect as though they were included in that Act. Sub-section 2.—The exporter of any of the prohibited goods or his agent shall be liable to the same penalty as that to which a person is liable under Section 186 of the Customs Act cited for illegally importing.

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* U.K. includes Great Britain, Northern Ireland, and the Isle of Man, but excludes the Irish Free State and the Channel Islands.

Section 10, Sub-section 1.—A constable or person authorised by a Secretary of State has power to inspect books or documents relating to dealings and stocks (see also Amendment in the 1923 Act). Sub-section 2.—Any person delaying, or obstructing, or failing to produce, or concealing, or attempting to conceal books, stocks, drugs or documents shall be guilty of an offence (an Amendment made in the 1923 Act is included herein).

Section 11.—Regulations made under this Act shall be laid before each House of Parliament and, if an address is presented to His Majesty within 21 days on which that House has sat next after any regulation is laid before it praying that the regulation may be annulled, His Majesty in Council may annul the regulation.

Section 12.—Licences may be granted by a Secretary of State on conditions (including payment of a fee).

Section 13.—Any person acting in contravention of, or failing to comply with, the Regulations or any conditions of his licence, etc., is guilty of an offence against the Act. The maximum punishment by the combined effect of this and the 1923 Act is, for each offence :—

1. On indictment (*i.e.* at Assizes or Quarter Sessions), a fine of £1,000 or penal servitude for 10 years, or both.
2. On summary conviction (*i.e.* at a Police Court), a fine of £250 or imprisonment with hard labour for 12 months, or both.
3. Forfeiture of the articles in respect of which the offence was committed.
4. Withdrawal of the offender's authorisation.

If the offence consists only of the contravention or failing to comply with a Regulation relating to "the keeping of books or the issuing or dispensing of prescriptions," and if the Court is satisfied that the offence was committed through inadvertence and not preparatory to or connected with the commission of any other offence, the maximum punishment is a fine of £50, but the offender's authorisation may, even in such a case, be withdrawn.

Sub-section 2B.—(FROM THE 1923 ACT.) If any person attempts to commit an offence, or solicits or incites another person to commit it, he shall, without prejudice to any other liability, be liable on summary conviction to the same punishment and forfeiture as if he had committed it.

Sub-section 2C.—(FROM THE 1923 ACT.) Where a person convicted of an offence is a *company*, the chairman and every director and every officer concerned in the management of the company shall be guilty of the like offence unless he proves that the act constituting the offence took place without his knowledge or consent.

Sub-section 3.—Proceedings before a court of summary jurisdiction may, notwithstanding any enactment prescribing the time within which such proceedings may be brought, be brought either within the time so prescribed or within three months from the date on which evidence sufficient to justify prosecution comes to the knowledge of the Secretary of State, whichever is the longer, and a certificate signed by him as to the date on which evidence comes to his knowledge shall be conclusive evidence thereof. This applies also (from the 1923 Act) to a person *attempting* or *soliciting* or *inciting* another person to commit the offence.

In respect of Scotland the Lord Advocate, and of Ireland, the Attorney General for Ireland, shall be substituted for a Secretary of State.

Any term of imprisonment for non-payment of a fine may be ordered to commence at the expiration of any term of imprisonment for the same offence in addition to the fine—(from the 1923 Act).

Section 14.—A constable may arrest any person who has committed an offence if he believes the person will abscond.

Section 15, Sub-section 1.—

"**Raw Opium**" includes powdered or granulated Opium, but does *not* include medicinal Opium.

"**Prepared Opium**" means prepared for smoking including dross and residues remaining after Opium has been smoked.

"**Medicinal Opium**" means raw Opium artificially dried.

"Approved Ports" means ports approved by Customs and Excise for the import or export of raw Opium.

Sub-section 2.—Any article is imported or exported under licence if the importer or exporter has a licence to import or export, and complies with the conditions, but not otherwise.

Section 16.—In application to Ireland the Act has effect subject to :—
(*a*) A reference to the Poisons (Ireland) Act, 1870, the Pharmacy (Ireland) Act, 1875, and the Pharmacy (Ireland) Act 1875 (Amendment), Act, 1890, being substituted for any reference to the Pharmacy Act, 1868; and
(*b*) Reference to the Pharmaceutical Society of Ireland being substituted for the Pharmaceutical Society of Great Britain.

STATUTORY RULES AND ORDERS (S.R. & O.), (MAY 20), 1921, No. 864, CONCERNING

RAW OPIUM.

(*Came into force September 1st*, 1921.)

In pursuance of Section 3 of the Dangerous Drugs Act, 1920, the following regulations were made, of which a summary is given :—

Sale and Distribution.

1. No person shall supply or procure, or offer to supply or procure **raw Opium** to or for any person whether in the United Kingdom or elsewhere, or shall advertise raw Opium for sale—(*a*) unless licensed or authorised ; or (*b*) otherwise than in accord with the terms and conditions of the licence or authority.

2. No person shall supply or procure, or offer to supply or procure raw Opium to or *for any person who is not licensed* or authorised to be in possession of it.

Possession.

3. No person shall be in possession or attempt to obtain possession of raw Opium (added by Order of October 2, 1922) unless (*a*) licensed to import or export, or (*b*) licensed or authorised to supply, or (*c*) otherwise licensed or authorised to be in possession of it.

Records.

4. A person who supplies raw Opium shall (*a*) enter in a register kept for the sole purpose all supplies purchased or obtained and all dealings effected (including sales or supplies to persons outside the U.K.) as shewn in the schedule ; (*b*) make entry with respect to purchases on the day it is received and with respect to sales or supplies by him on the day on which the transaction is effected ; or if not reasonably convenient on the day following ; (*c*) if he carries on business at more than one address keep a separate register for each set of premises ; (*d*) keep the register available for inspection ; (*e*) not cancel, obliterate or alter any entry or make any untrue entry. Any mistake in an entry may be corrected by a marginal note or footnote giving the correct particulars and dated.

The registers are to be kept 2 years from date of last entry (S.R. & O., OCT 2, 1922, NO. 1086).

General Authorisations.

(*In the following, throughout this Summary, 'medical practitioner' means 'duly qualified, i.e., registered medical practitioner' ; 'dentist' means 'registered dentist' ; 'veterinary surgeon' means 'registered veterinary surgeon.'—W. H. M.*)

5. Any *medical practitioner*, or any person lawfully *keeping open shop* for the retailing of poisons in accordance with the provisions of the Pharmacy Act, 1868, as amended by the Poisons and Pharmacy Act, 1908, or any person employed or engaged in *dispensing medicines* at any *public hospital* or other public institution being a *person duly registered* under the Pharmacy Act, 1868 (as amended), or a veterinary surgeon or person in charge of a laboratory for purposes of *research* or instruction attached to a University, University College, public hospital or other institution approved by the Secretary of State for the purpose, or any person *appointed by* a local authority with the approval of the Minister of Health as an *analyst* for the purposes of the Sale of Food and Drugs Act, 1875 to 1907, *is authorised so far as is necessary for the practice of his profession or employment* in such capacity *to be in possession of* and supply raw opium, but subject always to the provisions of the foregoing regulation.

6. The Secretary of State has power to *withdraw* authorisation in the event of an offence.

Delivery to Messengers.

7. Delivery shall not be made to a person not licensed or authorised to be in possession who *purports to be sent* by or *on behalf* of a licensed or authorised person unless he produces an authority in writing, signed by the person licensed or authorised to receive it on his behalf and unless the person supplying is satisfied that the authority is genuine. (In the case of raw Opium there is ***no exemption*** for prescriptions.)

"*Possession.*"

8. Raw Opium in the order or disposition of anyone is deemed to be in his possession.

Application to Ireland.

9. As under Section 16 (*a*) of the Act, *q.v.*

S.R. & O. 1921, MAY 20, 1921, No. 865.

MORPHINE, COCAINE, MEDICINAL OPIUM, etc.

Summary of Regulations under Section 7 of the 1920 *Act for controlling the manufacture, sale, possession and distribution of* ***Morphine, Cocaine, Ecgonine and Diamorphine*** *(commonly known as Heroin) and their respective salts and* ***medicinal opium,*** *and any admixture, extract or other preparation and substance containing not less than* ***one-fifth of one per cent. of Morphine or one-tenth of one per cent. of Cocaine, Ecgonine or Diamorphine.***

Application.

1. The drugs to which these Regulations apply are stated in the heading. The percentage in the case of Morphine is calculated as in respect of anhydrous Morphine.

Manufacture.

2. No person shall manufacture or carry on any process in the manufacture of Morphine, Cocaine, Ecgonine or Diamorphine, or their salts, or medicinal Opium—(*a*) unless he is licensed or authorised by these Regulations or by any authority granted by the Secretary of State to do so. (*b*) except on licensed premises; (*c*) otherwise than in accordance with the licence or authority.

Sale and Distribution.

3. No person shall supply or procure or offer to supply or procure any of the drugs to or for any person whether in the United Kingdom or elsewhere or shall advertise any of the drugs for sale—(*a*) unless licensed or authorised by these Regulations or by the Secretary of State to supply the drug or unless licensed to import or export or unless licensed or otherwise authorised to manufacture the drug or (but so far only as regards procuring the drug) unless he is licensed to procure the drug* or (*b*) otherwise than in accord with the licence or authority.

4. *Except* when the drugs are dispensed in pursuance of a ***prescription*** given by a medical practitioner, dentist or veterinary surgeon, or are supplied *by* a medical practitioner or veterinary surgeon *who dispenses* his own medicines, in accord with the conditions specified below, no-one shall supply, procure, or offer to supply or procure the drugs to or for any person in the U.K. who is not licensed or authorised to possess them nor to anyone licensed or authorised except in accord with the terms of the licence or authority.

Administration by or under the direct *personal supervision* of a medical practitioner or by or under the direct personal supervision of a dentist in dental treatment, or by or under the direct personal supervision of a veterinary surgeon in the treatment of any animal, shall *not* be deemed supplying the drug.

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*Note S.R. & O. 1923, No. 312.

Giving and Dispensing of Prescriptions.

5. A prescription must comply with the following:—

It must be ***in writing,*** must be ***dated*** and ***signed*** by the medical practitioner, dentist or veterinary surgeon, with his ***usual signature*** and address, and must specify the ***name and address of the person*** for whose use the prescription is given, and the ***total amount*** of the drug to be supplied, ***except*** that in the case of prescriptions used for ***N.H.I. purposes*** on the form provided by the Insurance Committee the medical practitioner's address need not be marked on the prescription.

A ***dentist*** may give a prescription for ***dental treatment*** only and it must be marked ***"For local dental treatment only."***

It shall only be given by a ***veterinary surgeon*** for the purposes of treatment ***of animals*** and shall be marked "For animal treatment only."

The Regulations contemplated the issue of an official form of prescription but no such form has been issued.

A medical practitioner who dispenses any of the medicine shall enter particulars in his day book or in the register specified below.

6. ***The Dispenser must:—***

(*a*) Only dispense the prescription if it is on an official form (if prescribed) or is acquainted with the person ***for whose use*** the prescription is given and has no reason to suppose that the prescription is not genuine.—***If an official form is not prescribed*** (*none* has been issued) a prescription for any of the drugs shall only be dispensed if the dispenser is ***acquainted with the signature*** of the medical practitioner, dentist or veterinary surgeon by whom the prescription purports to be given, and has no reason to suppose that the prescription is not genuine; or if he has taken ***reasonably sufficient steps*** to ***satisfy himself*** that the prescription is ***genuine.***—S. R. & O. 1923, No. 312.

(*b*) The drugs must not be supplied ***more than once*** on the same prescription, unless the prescription so directs; if it so directs, the drugs may be supplied on not exceeding ***three*** occasions, as directed in the prescription, at the ***intervals specified*** in the prescription. This does not authorise a treble quantity on one occasion.

(*c*) The ***prescription must be marked with the date on which it is dispensed,*** and shall be ***retained for 2 years*** (added 2nd Oct. 1922) by the person, firm or body corporate dispensing it, and (unless for N.H.I. purposes on the form provided by the Insurance Committee) shall be ***kept on the premises*** where it is dispensed and ***shall be available for inspection.***

Possession.

7. No person shall be in possession or *attempt* to obtain possession (added 2nd Oct. 1922, S.R. & O. 1087) unless—(*a*) licensed to import or export or (*b*) licensed or authorised to manufacture or supply or (*c*) licensed or authorised to be in possession, or (*d*) he proves that the drug was supplied for his use by a medical practitioner or veterinary surgeon or in accord with a prescription.

Marking of packages or bottles.

8. (i.) Morphine, Cocaine, Ecgonine, Diamorphine or their respective salts or any medicinal Opium packages or bottles must be plainly marked with the ***amount of the drug*** contained.

(ii.) Preparations, admixtures, extracts or other substance containing any of the last-mentioned drugs and coming within the Regulations shall not be supplied unless the package or bottle is plainly marked:—

(*a*) In the case of a powder, solution or ointment with the total ***amount*** contained ***and the percentage*** of the drug in the powder, solution or ointment;

(*b*) In the case of ***tablets*** or other articles with the amount of the drug in ***each article*** and the number of articles in the package or bottle.

This Regulation shall ***not apply when dispensed*** by a medical practitioner or on his prescription.

Records.

9. Every person who supplies any of the drugs shall—

(*a*) ***Enter in a register*** kept for the sole purpose ***all supplies*** purchased or obtained and all dealings in the drug effected by him (including sales or supplies to persons outside the U.K.) as shown in Schedule 1 *infra*.

(*b*) Separate registers or separate parts of the register shall be used for (*a*) Cocaine and Ecgonine and substances containing them, (*b*) Morphine and substances containing it, (*c*) Diamorphine and substances containing it, (*d*) medicinal Opium; provided that with the approval of the Secretary of State separate registers may be kept for separate departments of a business;

(*c*) Make the entry as to the drugs purchased or obtained by him ***on the day*** on which the drug is ***received*** and as to any ***sale*** or supply by him of it ***on the day*** on which the transaction is effected; ***or*** if not reasonably convenient on the ***day following***;

(*d*) Keep a separate register or registers in respect of each set of premises if there is more than one;

(*e*) Keep the register or registers in some part of the premises and at all times so as to be available for inspection.

(*f*) Not cancel, obliterate or alter any entry or make therein any entry which is untrue. Any mistake in an entry may be corrected by a marginal note or footnote giving the correct particulars and dated;

(*g*) He shall furnish to any person authorised by the Secretary of State, *e.g.* a police constable, information as to stocks and transactions.

A *medical practitioner* who records in a day book particulars of supplies by him to patients with name and address of the patients and date of supply, may, in lieu of keeping the register required by this Regulation of drugs sold or supplied by him, enter separately for each of the drugs in a book to be kept for the purpose *references* under the appropriate dates to the records in the day book of any supply of the drug. A *person keeping open shop* for the retailing of poisons may in lieu of keeping the register required by this Regulation of drugs supplied by him enter separately for each of the drugs in a book kept for the purpose *references* under the appropriate dates to the entries in the "Poisons Book" or "Prescription Book" kept by him in pursuance of Section 17 of the Pharmacy Act, 1868, relating to any supply of the drugs. Such books shall be available for inspection. Prescriptions, Records, Registers or other Documents to be preserved for 2 years—addition Oct. 2, 1922.

General Authorizations.

10. Any person lawfully keeping open shop for the retailing of poisons is authorised:—

(*a*) to manufacture at the shop in the ordinary course of his retail business any preparation, admixture or extract of any of the drugs;

(*b*) to carry on at the shop the business of retailing, dispensing or compounding the drugs, but subject to the provisions of these Regulations.

11. Any medical practitioner, or dentist or veterinary surgeon or any person employed or engaged in dispensing medicines at any public hospital or other public institution being a person duly registered under the Pharmacy Acts or any person in charge of a laboratory for research or instruction attached to any University, University College, public hospital or other institution approved by the Secretary of State, or any person ***appointed*** by a local authority with the approval of the Minister of Health ***as an analyst*** for the purposes of the Sale of Food and Drugs Acts, 1875 to 1907, ***is authorised so far as is necessary for the practice of his profession*** or employment in such capacity to be in possession of and supply the drugs.

12. Authorisation may be withdrawn in event of an offence.

Delivery to Messengers.

13. On the lines of raw Opium, *q.v.* This Regulation does not apply to dispensed medicines.

"*Possession.*"

14. On the lines of raw Opium, *q.v.*

Ships.

15. In the case of a ship not carrying a medical practitioner the master of the ship is an authorised person so far as is necessary to comply with the Merchant Shipping Acts. He may, subject to conditions prescribed by the Secretary of State, administer and supply the drugs to any member of the crew in accordance with instructions prepared or sanctioned by the Board of Trade. The keeping of a record of the use of the drugs in the official log in accord with the Merchant Shipping Acts shall comply with these Regulations as to keeping records.

S.R. & O. 1923, Sept. 10, No. 1095:—The following words are to be added:—

"If a *foreign* ship in any port in Great Britain requires to obtain a supply of any of the drugs in order to complete the necessary equipment of the ship, the master of the ship is authorised to purchase and be in possession of such quantity of any of the drugs as may be certified by the Medical Officer of Health of the Port where the ship is (or in his absence by the Assistant Medical Officer of Health of the Port) to be necessary for the purpose, the quantity not to exceed what is required for the use of the ship until it next reaches its home port. The certificate given by the Medical Officer or Assistant Medical Officer of Health of the Port shall be marked by the supplier with the date of supply and shall be retained by him and kept available for inspection."

Hospitals.

16. Hospitals or other public institutions may be exempted from regulations, subject to the observance of conditions.—*See* p. 990.

17. Drugs may be denatured in an approved manner.

Schedule I.

(*a*) Record of { Morphine, etc. / Diamorphine (Heroin), etc. / Cocaine, etc. / Medicinal Opium. } Purchased or otherwise obtained.

Date on which supply received.	Name of person, body or firm from whom obtained.	Address of person, body or firm from whom obtained.	Amount obtained.	Form in which obtained

(*b*) Record of { Morphine, etc. / Diamorphine (Heroin), etc. / Cocaine, etc. / Medicinal Opium } Sold or supplied.

Date on which the transaction was effected.	Name of person, body or firm to whom sold or supplied.	Address of person, body or firm to whom sold or supplied.	Authority of person, body or firm to be in possession of the drug.	Amount sold or supplied.	Form in which sold or supplied.	When sale is on a prescription, specify the ingredients of the prescription.

Schedule II.—Exempted preparations.

Cereoli iodoformi et morphinæ, B.P.C.
Emp. opii, B.P., 1898.
Lin. opii, B.P.
Lin. opii. ammon., B.P.C.
Pasta arsenicalis, B.P.C.
Pil. hydrarg. c. opio, B.P.C.
Pil. ipecac. c. scilla, B.P.
Pil. plumbi c. opio, B.P.
Pil. digitalis et opii co., B.P.C.
Pil. hydrarg. c. cret. et opii, B.P.C.
Pulv. cretæ aromat c. opio, B.P.
Pulv. ipecac. co., B.P. (Dover's Powder).
Pulv. kino co., B.P.
Suppos. plumbi co., B.P.
Tablettæ plumbi c. opio, B.P.C.
Ung. gallæ c. opio, B.P. (gall and opium ointment).
Ung. gallæ co., B.P.C.

(These preparations, nevertheless, come under the provisions regulating the sale of Poisons and Pharmacy Laws.)

Exempted preparations.

We received the following direct statement from the Home Office:—

"Preparations can only be regarded as exempted from the Regulations if they comply exactly with a formula specified in Schedule II. or differ only from the Schedule by the addition of some INERT substance or the substitution of one INERT substance for another."

HOSPITALS,* &c.

By order of 15th August, 1921, the Home Secretary has exempted from the operation of the Regulations, any hospital or infirmary, asylum, poor law institution or sanatorium supported by any public authority or out of public funds or by a charity or by voluntary subscription in which the drugs are dispensed by a medical practitioner or a pharmacist or—in a poor law institution—a dispenser whose qualifications and appointment are approved by the Minister of Health if the conditions of Schedule I. (below) are complied with, or, if there is no such dispenser, if the conditions of Schedule II. (below) are complied with.

SCHEDULE I.

1. All orders for supplies must be signed by one of the medical practitioners attached to the hospital or other institution, or, if the dispenser is a fully qualified pharmacist, by the dispenser.

2. All supplies to be received by, and kept in the charge of, the person responsible for dispensing medicines, and records to be kept.

3. The medicine only to be dispensed for use of an individual patient, etc.

4 & 5. The person responsible for dispensing the drugs shall at the time of dispensing any prescription stamp, or otherwise mark, the prescription and shall keep records (to be kept 2 years).

6. Stock preparations of the drugs required to be kept in the wards or in the out-patient department shall only be supplied by the dispensary on the written requisition of the sister in charge of the ward or out-patient department, and shall be kept by her under lock and key, and shall only be used by her in accordance with the directions of one of the medical practitioners in charge of the patients.

7. A requisition shall be marked in the dispensary to show that it has been complied with, and shall be filed in the dispensary, and a copy or note of the requisition shall be kept by the sister in charge.

8. Precautions shall be taken to prevent any theft of the drugs.

9. Particular preparations of any of the drugs may be prescribed by reference to any conventional name by which they are known in the hospital.

SCHEDULE II.

Supplies are to be to, or on the order of, a medical practitioner attached to the hospital and he must certify that the supply is necessary for the treatment of the patients. The matron is to be responsible for keeping the drugs (in a locked cupboard) and for using or administering them and recording their purchase, but they are only to be used, etc., under the direction of a medical practitioner attached to the hospital. Except so far as the Schedules apply, the Regulations must be observed—for instance the chemist supplying a hospital must record the supplies, get them signed for and mark the packages as on ordinary sales.

NURSING HOMES. The exemption does not apply.

SPECIAL AUTHORISATIONS. (H.O. Aug., 1921.).

Laudanum to Farmers and Stockowners.

Laudanum for use solely in the treatment of animals may be sold to farmers and stockowners, *who hold an authorisation from the chief officer of police* for the area in which they work. Purchaser must sign Poisons Book.

Cocaine in Castor Oil to Factory Occupiers.

(Factory & Workshops Act, 1901.)

A preparation for the treatment of injury to the eyes, consisting of not more than 1 *part of Cocaine in* 200 *of Castor Oil*, with not less than 1 part in 3,000 of Mercuric Chloride, may be sold to the occupier of a factory or workshop to which the Factory and Workshop Act, 1901, applies.

****Dangerous Drugs (Hospital General Exemption Order) (1924)*** relieves hospital pharmacists from adhering to restrictions of distribution except where finished article is within the Act.—P.J. ii./24,312. C.D. Sept. 13, 24, p. 393.

Preparations of Opium to Midwives.

Preparations containing Opium (but not Morphine tablets) may be sold to certified and *practising* midwives for use in their profession or employment. They must sign the Poisons Book, and must be introduced if strangers.

Tinct. Chlorof. et Morph. Co. and Tinct. Opii to Fishing Boat Skippers.

Tinct. Chlorof. et Morph. Co. (1 ounce only) and **Tinct. Opii** (2 ounces only) may be sold to the skippers of British fishing boats, who are entered in the Fishing Boats Register. Purchaser must sign Poisons Book.

S.R. & O., MARCH 28, 1922, No. 298.

Concerning Marking Raw Opium for Export.

Packages for export otherwise than by parcel post, shall be marked on one side and on top with lettering at least two inches in height, with the words "RAW OPIUM, NET WEIGHT," and the number of pounds, the whole enclosed by a rectangular border at least one-half of an inch in width.

Packages sent by parcel post shall be marked in conspicuous and indelible block lettering with the words "RAW OPIUM, NET WEIGHT," and the number of pounds, the whole enclosed by a rectangular border.

The marking shall be on the package itself, and not on a label, ticket, or other thing attached thereto. No words, letters or figures, except those prescribed shall be placed within the rectangular border.

S.R. & O., OCT. 2, 1922, No. 1086.

1. Regulation 3 of the Regulations of 20th May, 1921 (S.R. & O. 1921, No. 864) amended. We have made the addition.

2. The registers to be kept for two years from the date of the last entry.

S.R. & O. OCT. 2, 1922, No. 1087.

Amending the Regulations made under Section 7 of the 1920 Act on the 20th May, 1921 (S.R. & O., 1921, No. 865):—

1. "The prescription shall not be given for the use of the prescriber himself." was to be added; subsequently ***revoked*** (S.R. & O., May 16, 1923, No. 577).

2. To add to Regulation 7 of the Principal Regulations "or attempt to obtain possession of." We have made the addition.

3. Prescriptions, records, registers or documents to be preserved for not less than two years.

DANGEROUS DRUGS AND POISONS (AMENDMENT) ACT, 1923. (17*th May*, 1923.)

(13 & 14 Geo. 5.)

An Act amending the Dangerous Drugs Act, 1920, *and Section seventeen of the Pharmacy Act,* 1868, *and to prescribe the method of calculating percentages in liquid preparations for the purpose of the Poisons and Pharmacy Act,* 1908, *and the Dangerous Drugs Act,* 1920.

1.—(1) This sub-section to be inserted in section 10 of the Dangerous Drugs Act, 1920, after sub-section (1), concerns searching of premises under Authority of Justice of the Peace.

(2) Amendments in this sub-section of Section 10 of the 1920 Act have been made in our pages.

2. This section, in several sub-sections, is to be substituted in the 1920 Act bringing in a wider scope of definition of a person guilty of offence, *e.g.* with regard to false declarations, also as to *aiding* and *abetting* in any place even *outside* Great Britain in an offence punishable under any corresponding law in force in that place. *The salient points of sub-section 2 of this section we have incorporated in the* 1920 *Act.*

Sub-section 3 (*a*).—It is not necessary to negative by evidence any licence, authority or other matter of exception or defence, and the burden of proving any such matter lies on the person seeking to avail himself thereof.

Sub-section 3 (*b*) of this section of the Act regarding non-payment of fines, *we have added to Section* 13 *of the* 1920 *Act.*

***Amendment as to dealing with Medical Men in* P1.**

POISONS IN GENERAL.

3.—(1) So much of section 17 of the Pharmacy Act, 1868, as requires an entry in the Poisons book signed by the purchaser, shall not, subject to the following conditions, apply where the purchaser is a medical practitioner, and the purchase is made by him for the purposes of his profession.

(2) (*a*) There must have been received by the seller before the sale a ***written order*** signed by the purchaser stating his name and address and the name and quantity of the article to be purchased.

(*b*) The seller must be ***reasonably satisfied*** that the signature is the signature of the person purporting to sign it, and that that person is a medical practitioner.

(*c*) The article sold, if sent by post to the purchaser, ***must*** be sent ***by registered post.***

(*d*) The seller must enter in the ***Poisons Book,*** in the column assigned to the signatures of purchasers, the words ***"signed order"*** with the ***date*** on which the order is ***executed*** and must preserve the order for two years from the date of the entry.

If a seller is reasonably satisfied that a ***medical practitioner*** desiring to purchase the poison urgently requires it for his profession, but by reason of some emergency is ***unable*** before delivery, either ***to furnish to the seller*** an order in writing duly signed, or to attend and sign the Poisons Book, the seller may send the poison to the purchaser to ***be handed over*** to him either ***in exchange*** for such an order or on an undertaking by the purchaser to furnish such an order within 24 hours.

If the purchaser by whom the undertaking has been given fails to deliver a signed order, or if any person for the purpose of obtaining delivery of the poison under the foregoing proviso makes a statement which is to his knowledge false, he shall be deemed to have procured the commission of an offence under the said Section 17.

(3) This section applies to dentists and veterinary surgeons as it applies to medical practitioners.

4.—(1) Where any poison to which Section 17 of the Pharmacy Act, 1868, applies is supplied in accordance with a written N.H.I. PRESCRIPTION given by a medical practitioner the seller shall not be required to make any entry in the book (Poisons Book) in accordance with the said section.

(2) Section 17 of the Pharmacy Act 1868 shall have effect as if for the words "labelled with the name of the article and the word poison, and with the name and address of the seller of the poison," there were substituted the words "labelled with the name and address of the seller of the poison, with the word 'poison,' and with the name of the poison (the underlined is new), and in the case of a preparation which contains a poison as one of the ingredients thereof, with *such particulars as to the proportion which the poison contained in the preparation bears to the other ingredients as may be prescribed by Order in Council.*" (No Order in Council has yet been made on this subject.)

5.—For the purposes of the Schedule to the Poisons and Pharmacy Act, 1908, and of section 8 of the Dangerous Drugs Act, 1920, ***percentages*** in the case of liquid preparations shall, unless other provision in that behalf is made by regulations under those Acts respectively, be calculated on the basis that a *preparation containing one per cent. of any substance means a preparation in which one gramme of the substance, if a solid, or one millilitre of the substance,* if a liquid, is contained in *every one hundred millilitres of the preparation,* and so in proportion for any greater or less percentage.

6.—(Sub-section 2) "Corresponding law" in the 1920 Act, as amended by this Act, means any law stated in a certificate purporting to be issued by or on behalf of the government of any country outside Great Britain to be a law providing for the control and regulation in that country of the manufacture, sale, use, export and import of drugs in accordance with the provisions of the *International Opium Convention* signed at the Hague 23/1/1912, and any statement in any such certificate as to the effect of the law mentioned in the certificate, or any statement mentioned in any such certificate that any facts constitute an offence against that law, shall be conclusive. (Sub-section 3). This Act shall not extend to Northern Ireland, except in matters in which the Parliament of Northern Ireland have not power to make laws.

References.

Reprint of *Final* Regulations under Section 3 of the 1920 Act.—P.J. i./21, 407; see also *ibid.* 423, 431; *Draft* Regulations *ibid.* 29, 33, 47, 63, 71, 88, 114. See also L. i./21,134. For references to the 1923 Act *vide postea.*

Replies of Revision Committee appointed by the Home Secretary to objections raised by 31 Professional Bodies concerning Draft Regulations.—L. i./21,1193,1205.

The passage of the Dangerous Drugs Act, 1920, endeavoured to give legislative effect, so far as Great Britain was concerned to the obligations incurred under the International Opium Convention signed at the Hague 1912. An Advisory Committee was appointed by the Council of the League of Nations. Need to restrict production (of Opium, etc.). Smuggling widely prevalent. —L. i./21,919; B.M.J. ii./21,329.

Analysis of 185,000 Insurance Prescriptions in Scotland, May, 1922. Opium *per se* or in various forms of admixtures occurred 13,587 times (7·3%); to tal quantity 11¼ lbs. Cocaine in various forms 347 times (0·18%); total quantity 1043·57 grains. Morphine 10,690 times (5·7%). Demonstrative proof of the comparatively small use of narcotic drugs in medicine, and of the rarity of preparations containing 0·2% Morphine or Diamorphine, or 0·1% Cocaine.—P.J. ii./22,285.

Poison Antidotes Bill threatened! Every bottle of poison to have its antidotes on the label.—P.J. ii./21,405.

A Plymouth chemist fined £100 for failing to register all Dangerous Drugs sold by and supplied to him.—P.J. i./23,421.

The proposed amendment that 'The prescription shall not be given for the use of the prescriber himself'—the words to be added to Regulation V. of the Principal Regulations made May 20th, 1921—would appear to cast a slur on the medical profession in general.—L. ii./22,406. (The Regulation was *revoked.*)

Cocaine Dental Anæsthetics. In view of the Dentists Act 1921, the authority under the Dangerous Drugs Act, 1920, to certain *un*registered dental practitioners to purchase dental anæsthetics containing Cocaine, was withdrawn Nov. 30, 1922.

National Health Insurance Amendment, as to Raw Opium, also re *full* surname (the latter subsequently withdrawn).—P.J. i./23,44,49.

The Amendment Bill presented by the Home Secretary February 15th, 1923.—P.J. i./23,169.

Those who govern us should be prepared to trust the Medical Profession.—Leader, L. i./23,660.

The Earl of Onslow in moving the second reading of the Amendment Bill in the House of Lords (Apl. 25/23), pointed out that people who commit purely technical offences were insured against the risk of heavy penalties. because it was provided that no proceedings for an indictable offence should be instituted without consent of the Attorney-General or the Director of Public Prosecutions.—B.M.J. i./23,779.

W/v method of calculating percentages for Dangerous Drugs Act sanctioned. An Amendment of the principal Act.—P.J. i./23,179.

Summary of the 1923 Act. A statement by the Home Office reprinted (May 28/23).—B.M.J. i./23,939.

DRAFT 'LABELLING OF POISONS ORDER, 1924.'

Pursuant to Section 4, *Sub-section* 2 *of the* 1923 *Act.*

To come into force 12 months from date of Order in Council.

The particulars to be stated shall be the proportion stated as percentage or otherwise. B.P. or B.P.C. preparations sold with or without dilution need have only a reference to these works and when sold with dilution, the proportion of the total ingredients. Not to apply to Tablets, Pills, Cachets, etc.—P.J. ii./24.194.

POINTS OF ASSISTANCE.

In a memorandum issued from the Home Office (1st Edition, March, 1923, reprinted B.M.J. i./23,69; 2nd Edition covering the 1923 Act, in addition, issued July, 1923) it is stated that after consultation with the Minister of Health and the Scottish Board of Health it has been arranged for 'inspection' to be carried out in England and Wales by *Medical Officers of the Ministry of Health*, and in Scotland by Medical Officers of the Scottish Board of Health.

Notes from the memorandum: A medical practitioner (but not a dentist) may dispense dangerous drugs for the use of his patient; he may also have raw Opium for use in compounding medicines, but raw Opium may not be supplied to a patient.

"Signed Orders" *in Wholesale Dealings re Part I. Poisons.* The intention of the alteration of Section 17 of the Pharmacy Act 1868, is to require signed orders from all persons except retail chemists.—C. D. June 16/23,843.

Wholesale dealing in Dangerous Drugs cannot be conducted without licences. A retail pharmacist can supply the drugs against 'signed orders,' but a pharmacist doing a wholesale and retail trade must apply for licences in respect of the wholesale side of his business. The licences run to about £13 p.a. with 2s. 6d. each for every licence for export.

Points liable to be forgotten in practice are:—

All the drugs covered by the Acts are [P1] Poisons.

Dentists' and veterinary surgeons' (not doctors') prescriptions must have the amount of the drug stated on the label.

N.H.I. prescriptions need not have doctor's address; must *not* be repeated; must be kept as hitherto and sent to Pricing Bureau.

Typewritten prescriptions are accepted as 'written.'

The inclusion of the words "to attempt" to obtain the drugs is to deal with a person who tries to obtain through misrepresentation, even though the chemist discovers the fraud before parting with them.

Doctors may write prescriptions for themselves.

Telephone orders from medical practitioners may be executed, but the written order must follow within 24 hours. If it does not, the chemist has committed an offence.

Nursing Homes are not authorised persons.

Public Analysts and Teachers requiring the drugs must sign the Poisons Book.

Persons in charge of a laboratory must prove that the Institution to which it is attached has been approved by the Home Office for Dangerous Drugs Act purposes.—Mallinson.

A ***foreign*** medical practitioner, unless registered in England (see Register) is not a medical practitioner under the Act.

When in doubt—refuse to dispense, if the doctor is not known. The chemist is not legally bound to supply anything.

NOTICE TO EMPLOYEES.

D. D. A.

(Amended to include the 1923 Act.)

(The joint author—conducting a wholesale and retail business—has found this reminder a useful help.)

Comply with the 1920 and 1923 Acts and Regulations, copies of which you are to possess.

Prescriptions must be dated and signed with doctor's *usual* signature, etc., and name and address and bear

Patient's name and address and the

Total amount of drug must be stated on the prescription.

May be dispensed not more than 3 times if so stated on prescription (intervals to be specified). Enter up each time.

When given by a dentist, to be marked "For local dental treatment only."

Veterinary prescriptions to be marked "For animal treatment only."

Chemist must know the signature, or be acquainted with the medical man, dentist, veterinary surgeon, etc., in question.

If you can, make sure the doctor, dentist or veterinary surgeon is on the Register.

Have no reason to doubt whether the prescription is genuine.

Prescription to be marked by dispenser with date dispensed.

Retain prescriptions 2 years, in order, tied together, for reference.

Make record in book (D.D.A.), on the day or next day, and copy in Prescription Book.

Delivery to Messengers. Note Regulation 13 to Statutory Rules, 1921, No. 865.

Supplies to Medical Men (etc.).

This applies both to wholesale and retail. See Section 3 of 1923 Act.

All Dangerous Drugs (including preparations) *and Part I. Poisons* to be entered in Poisons Book and the *signed order* to be retained 2 years. There must be name and address (and date) and the nature and amount of the poisons.

Chemist must be satisfied as to genuineness.

If sent by post, poisons to a doctor must be sent by *Registered Post.*

In *addition*, entry to be made in Cocaine, etc. Registers.

Medical men may only have Dangerous Drugs so far as is necessary for the practice of their profession.

The *stock* of Dangerous Drugs, as far as practicable, will be kept in special D.D. cupboard situated.....

X.Y.Z. will have *sole access* to it. The key will be kept.....

Make yourselves fully conversant with the Acts, and watch for alterations—as reported in the *Pharmaceutical Journal.*

DANGEROUS DRUGS ACT

TABLES.

We have made the following calculations which should be of assistance to Medical Practitioners.

The following, and any quantities of drugs above the following, are within the meaning of the Act.

MIXTURES, INJECTIONS, NEBULÆ (SPRAY SOLUTIONS) and other liquid preparations.

'DRUG.'	PERCENTAGE LIMIT OF 'DRUG' ALLOWED IN A MIXTURE, ETC.	AMOUNT PER FLUID OUNCE.
Morphine (Anhydrous Base)	0·2	$\frac{7}{8}$ grain
,, **Acetate.** *Off.*	0·28	$1\frac{9}{40}$,,
,, **Hydrochloride.** *Off.* ..	0·26	$1\frac{11}{80}$,,
,, **Tartrate.** *Off.*	0·27	$1\frac{29}{160}$,,
,, **Sulphate.**	0·27	$1\frac{29}{160}$,,
,, **Hypophosphite.**	0·25	$1\frac{3}{32}$,,
Liquor Morphinæ Acetatis. *Off.* ..	28·0	135 minims
,, ,, **Hydrochloridi.** *Off.*	26·0	125 ,,
,, ,, **Tartratis.** *Off.* ..	27·0	130 ,,
Injectio Morphinæ Hypodermica (Tart.) *Off.*	10·8	52 ,,
Cocaine (Base)	0·1	$\frac{7}{16}$ grain
,, **Hydrochloride.** *Off.*	0·112	$\frac{1}{2}$,,
,, **Nitrate**	0·12	$\frac{21}{40}$,,
Injectio Cocainæ Hypodermica. *Off.*	2·24	10 minims
Extractum Cocæ Liquidum (0·5% alkaloids)	20·0	96 ,,
Diamorphine (*Base, i.e* Diamorphine under the Act)	0·1	$\frac{7}{16}$ grain
Diamorphine Hydrochloride (Heroin Hydrochloride)	0·115	$\frac{1}{2}$,,
Opium Medicinal. *Off.* (Raw Opium artificially dried containing 10% Anhydrous Morphine)	2·0	$8\frac{3}{4}$ grain
Extractum Opii Liquidum. *Off.* .. (0·75 Anhydrous Morphine)	26·6	128 minims
Extractum Opii Siccum. *Off.* .. (20% Anhydrous Morphine)	1·0	$4\frac{3}{8}$ grain
Liquor Opii Sedativus .. .. .. (1·5% Morphine)	13·3	64 minims
Tinctura Opii (1% Anhydrous Morphine)	20·0	96 ,,
Pulvis Opii Compositus. *Off.* .. (10% Opium)	20·0	$87\frac{1}{2}$ grains
Pulvis Cretæ Aromaticus cum Opio. *Off.* ($2\frac{1}{2}$% Opium)	80·0 *Exempted* if not admixed with other active ingredients	350 ,,
Pulvis Ipecacuanhæ Compositus (10% Opium)	20·0 *Exempted* if not admixed with other active ingredients	$87\frac{1}{2}$,,
Pulvis Kino Compositus (5% Opium)	40·0 *Exempted* if not admixed with other active ingredients	175 ,,

PILLS AND TABLETS.

'Drug.'	Limit Percentage Allowed.	
Pilula Ipecacuanhæ cum Scilla. *Off.* [About 5% of Opium (0·5% Morphine)]	40·0 but *exempted* if not admixed with other active ingredient	Irrespective of weight and size of pill or tablet.
Pilula Ipecacuanhæ cum Urginea. *Off.* [About 5% Opium]	40·0	
Pilula Plumbi cum Opio. *Off.* .. [About 12% Opium (1·2% Morphine)]	16·6 but exemption as above.	
Pilula Saponis Composita. *Off.* .. [About 20% Opium (2% Morphine)]	10·0 *not exempted*	

Limit Amount Allowed in One Grain.

Pilula Morphinæ Hydrochloridi	$\frac{1}{380}$ gr.	**Diamorphine (Base)** ..	$\frac{1}{1000}$ gr.
Pilula Morphinæ Sulphas	$\frac{1}{370}$,,	**Diamorphine Hydrochloride** ..	$\frac{1}{870}$,,
Pilula Morpinæ Tartratis ..	$\frac{1}{370}$,,	**Opium**	$\frac{1}{50}$,,
Cocaine Base	$\frac{1}{1000}$,,	**Extractum Opii Siccum**	$\frac{1}{100}$,,
Cocaine Hydrochloride	$\frac{1}{890}$,,	**Pulvis Opii Compositus**	$\frac{1}{5}$,,
Cocaine Nitrate	$\frac{1}{830}$,,	**Pulvis Ipecacuanha Compositus** ..	$\frac{1}{5}$,,
Extractum Cocæ (Solid) 2% alkaloids	$\frac{1}{20}$,,	**Pulvis Kino Compositus**	$\frac{2}{5}$,,

LOZENGES.

Generally made to weigh 20 grains.

'Drug.'	Limited Amount allowed in Lozenges.	
Morphine Hydrochloride	$\frac{1}{19}$ grain ..	[The *Off.* Troch. Morphinæ ($\frac{1}{32}$ grain) are therefore outside the Act.]
Cocaine Hydrochloride	$\frac{1}{45}$,, ..	
Diamorphine (Base)	$\frac{1}{50}$,, ..	
Diamorphine Hydrochloride	$\frac{1}{44}$,, ..	
Opium	$\frac{2}{5}$,, ..	
Extractum Opii Siccum	$\frac{1}{5}$,, ..	
Trochiscus Krameriæ et Cocainæ—*cf.* **Cocaine Hydrochlor.** above.		

LINIMENTS AND LOTIONS.

'Drug.'	Limit Percentage Allowed.	Amount per Fluid Ounce.
Linimentum Opii. *Off.* .. (0·5% Morphine)	.. 40·0 (Exempted if not admixed with other active ingredients.)	192 minims
Tinctura Opii .. .. (in a liniment or lotion)	.. 20·0	96 ,,
Oleatum Morphinæ (1 in 60)	.. 12·0	58 ,,

SUPPOSITORIES, PESSARIES, OVULES AND TAMFONS.

'Drug.'	Limit Amount Allowed.
Morphine Hydrochloride	$\frac{13}{40}$ grain in 125 grains, or $\frac{1}{25}$ gr. in 15 grains
Cocaine (Base)	$\frac{1}{4}$,, ,, 250 ,, ,, $\frac{3}{200}$,, 15 ,,
Cocaine Hydrochloride	$\frac{7}{225}$,, ,, 250 ,, ,, $\frac{1}{60}$,, 15 ,,
Extractum Cocæ (2% alkaloids)	$12\frac{1}{2}$,, ,, 250 ,, ,, $\frac{2}{4}$,, 15 ,,
Diamorphine (Base)	$\frac{1}{4}$,, ,, 250 ,, ,, $\frac{3}{200}$,, 15 ,,
Diamorphine Hydrochlor.	$\frac{2}{7}$,, ,, 250 ,, ,, $\frac{1}{60}$,, 15 ,,
Opium (*Off.*)	5 ,, ,, 250 ,, ,, $\frac{3}{10}$,, 15 ,,
Plumbi Composita. *Off.*	The *Off.* Suppositories are *exempted.*
Extractum Opii. *Off.*	$2\frac{1}{2}$ grains in 250 grains or $\frac{3}{20}$ grain in 15 grains

BOUGIES.

$2\frac{1}{2}$ inches made with Oleum Theobromatis weigh 20 grains.
$2\frac{1}{2}$,, ,, ,, Bougie Mass weigh 25 grains
4 ,, ,, ,, Oleum Theobromatis weigh 40 grains.
4 ,, ,, ,, Bougie Mass weigh 50 grains.

'Drug.'	Limit Amount.
Morphine Hydrochloride	$\frac{1}{19}$ grain in 20 grains ($\frac{1}{15}$ in 25, $\frac{2}{19}$ in 40, $\frac{2}{15}$ in 50 grains).
Cocaine Hydrochloride	$\frac{1}{45}$,, ,, 20 ,, ($\frac{1}{36}$ in 25, $\frac{2}{45}$ in 40, $\frac{1}{18}$ in 50 grains).
Opium. *Off.*	$\frac{2}{5}$,, ,, 20 ,, ($\frac{1}{2}$ in 25, $\frac{4}{5}$ in 40, 1 in 50 grains).

OINTMENTS, PASTES, ETC.

'Drug.'	Limit Percentage Allowed.	Amount Per Ounce (Avoir).
Morphine (Anhydrous Base)	0·2	$\frac{7}{8}$ grain
Morphine Hydrochloride	0·26	$1\frac{11}{80}$,,
Cocaine (Base)	0·1	$\frac{7}{16}$,,
Cocaine Hydrochloride	0·112	$\frac{1}{2}$,,
Unguentum Gallæ cum Opio. *Off.*	Exempted.	
Opium	2·0	$8\frac{3}{4}$,,
Extractum Opii Siccum	1·0	$4\frac{3}{8}$,,

EXAMPLES OF ℞ PRESCRIPTIONS.

J. Jones, Esq.,
100, Portland Place,
London, W.
(*The name and address of patient* **must** *appear on every prescription*).

℞

Morphine .. .. .. $\frac{1}{30}$ grain
Sodium Bicarbonate .. .. 8 grains
Magnesium Carbonate .. .. 7 grains
Fiat. pulv. 1, *mitte tales* 60. *Sig.* 1 *t.d.s.*
Total amount of Morphine, 2 grains.
To be repeated on July 21*st*, 1924, *and on August* 11*th*, 1924, *only.*

R. Mason, M.D.,
317, Harley Street, W. 1.
June 30th, 1924. (*Usual signature, qualifications and address*).

℞

Liquid Extract of Opium .. 2 ounces
Extract of Belladonna .. $\frac{1}{2}$ ounce
Glycerin to .. .. .. 6 ounces
Sig. To be applied on lint 2 or 3 times a day.
Total Morphine content, $6\frac{9}{16}$ grains.
Not to be repeated.
July 15th, 1924. (*Usual signature, qualifications and address*).

℞

Ext. Cocæ Liq. .. .. .. 1 drachm
Syl Vanillæ .. .. .. 1 drachm
Elix. Saccharin .. .. .. 5 minims
Aq. ad .. .. $\frac{1}{2}$ ounce
Send 16 ounces. *Sig. Coch. mag. p.r.n.*
Total Coca Alkaloids, $8\frac{3}{4}$ grains.
To be repeated on July 21*st*, 1924, *and August* 11*th*, 1924, *only.*
June 30th, 1924. (*Usual signature, qualifications and address*).

℞

Cocaine Hydrochloride .. $\frac{1}{2}$%
Menthol .. .. $2\frac{1}{2}$%
White Soft Paraffin .. .. *q.s.*
Send 4 drachms. *Sig.* The ointment for the nose
Total Cocaine Hydrochloride, $1\frac{1}{5}$ grains.
Not to be repeated.
August 1st, 1924. (*Usual signature, qualifications and address*).

℞

Morphine Hydrochloride .. $\frac{1}{2}$ grain
Theobroma Oil to .. .. 15 grains
M. ft. Suppos. 1 ; *mitte* 36.
Total Morphine Hydrochloride, 18 grains.
Not to be repeated.
July 2nd, 1924. (*Usual signature, qualifications and address*).

℞

Pulv. Cretæ Aromat. c. Opio.. 10 grains
Ext. Nucis Vom. .. .. $\frac{1}{8}$ grain
Misce et fiat Slipule i. Mitte XII.
Sig. i. to be taken thrice daily between meals.
Total Opium, 3 grains.
Not to be repeated.
June 24th, 1924. (*Usual signature, qualifications and address*)

℞
Injectio Morphinæ Hypodermica, B.P. 10 Cc.
Fiant ampullæ XX. Sig. i. s.o.s.
Total Morphine Tartrate, 0·25 Gm.
Not to be repeated.
July 14th, 1924. (*Usual signature, qualifications and address*).

℞
Pulv. Opii .. .. .. 3·75 Gm.
Pulv. Gallæ .. .. .. 12·5 Gm.
Ung. Hamamelidis ad .. .. 50·0 Gm.
Fiat unguentum. Sig. m.d.a.
Total Opium Content, 3·75 Gm.
Not to be repeated.
June 9th, 1924. (*Usual signature, qualifications and address*).

℞
Cocaine Hydrochloride .. $\frac{1}{10}$ grain
Morphine Hydrochloride .. $\frac{1}{6}$ grain
Fiat aurinarium ; mitte 20. *Sig.* One to be inserted when the pain is severe.
Total Cocaine Hydrochloride, 2 grains.
Total Morphine Hydrochloride, 4 grains.
Not to be repeated.
August 4th, 1924. (*Usual signature, qualifications and address*).

℞
Cocaine Hydrochloride .. $\frac{1}{2}$ grain.
Theobroma Oil .. .. .. *q.s.*
Fiat bougie i.—4 ins. in length ; *mitte XII. Sig.* To be used as directed.
Total Cocaine Hydrochloride, 6 grains
Not to be repeated.
July 22nd, 1924. (*Usual signature, qualifications and address*)

Resorcin .. .. 40 grains
Solution of Cocaine Hydrochloride, $\frac{1}{2}$% to 4 ounces
Sig. To be used in nasal spray 3 or 4 times a day.
Total Cocaine Hydrochloride, $8\frac{3}{4}$ grains.
Not to be repeated.
July 1st, 1924. (*Usual signature, qualifications and address*).

℞
Morphine Bimeconate .. .. $\frac{1}{8}$ grain
Butyl Chloral Hydrate.. .. 3 grains.
Gelseminine Hydrochloride .. $\frac{1}{200}$ grain
Fiat pilula, mitte 8. *Sig.* 1 every half hour until 4 pills are taken and then every hour for 4 hours.
Total Morphine Bimeconate, 1 grain.
Not to be repeated.
August 2nd, 1924. (*Usual signature, qualifications and address*).

℞
Trochisci Menthol c. Heroin, $\frac{1}{12}$th grain, 1 ounce.
Sig. Take one for cough.
Total Heroin Hydrochloride, $1\frac{2}{3}$ grains.
Not to be repeated.
June 23th, 1924. (*Usual signature, qualifications and address*).

℞

Cocaine Hydrochloride .. ½ grain
Adrenalin.. .. .. .. $\frac{1}{500}$ grain
Glycogelatin basis .. .. *q.s.*
Fiat ovule i. Mitte XII *Sig. m.d.u.*
Total Cocaine Hydrochloride, 6 grains.
Not to be repeated.

July 28th, 1924. (*Usual signature, qualifications and address*).

℞

Tinct. Opii .. .. ..
Acid Sulph. Aromat. .. .. *aa* 2 drachms.
M. ft. guttæ. Sig. Guttæ viginti ex aqua quotidie sumendæ.
Total Morphine content, $1\frac{1}{5}$ grains.
Not to be repeated.

July 12th, 1924. (*Usual signature, qualifications and address*)

EXAMPLE OF DENTIST'S PRESCRIPTION.

Name and address of the patient.

℞

Cocaine Hydrochloride .. 10 grains
Adrenalin Solution .. .. 10 minims
Distilled Water to .. .. ½ ounce
Total Cocaine Hydrochloride, 10 grains.
(*Dispenser must state this on label.*)
Apply with a pledget of wool to the part occasionally;
FOR LOCAL DENTAL TREATMENT ONLY.
To be repeated at intervals specified.

.....L. D. S.

June 10th, 1924. (*Usual signature, qualifications and address*):

EXAMPLE OF VETERINARY SURGEON'S PRESCRIPTION.

Name and address of
Owner of dog.

℞

Opium in powder .. .. 20 grains
Sulphur Ointment to .. .. 1 ounce
Total Opium content, 20 grains.
(*Dispenser must state this on label.*)
For the dog.
FOR ANIMAL TREATMENT ONLY.

....., M.R.C.V.S.

June 10th, 1924. (*Usual signature, qualifications and address*)

EXAMPLE OF 'SIGNED ORDER.'

By Medical Man complying with 1923 Act.
for ***postal transmission of*** [P1] ***Poisons in general***
(whether Dangerous Drugs or not.)

Please send me (by *Registered* Post):—
Opium Medicinal in powder, 4 ounces.
Ext. Cocæ Liq., 1 lb.
Morphine Hypophosphite, 1 ounce.
Diamorphine Tablets, $\frac{1}{10}$ grain, 100.
Liq. Strych. HCl., 4 ounces.
Ext. Nucis Vom. Liq., ½ lb.
(*Usual signature, qualifications and address*).

SIMILAR SIGNED ORDERS SHOULD BE GIVEN BY A DENTIST OR VETERINARY SURGEON.

Caution.—The requirements of the Act are ***in addition*** to the provisions of Sect. 17 Phcy. Act 1868. The purchaser must ***be known to the seller*** or be ***introduced.*** Failing this, the pharmacist should refuse to supply.

VENEREAL DISEASE ACT, 1917.

(ABSTRACT.)

An Act to prevent the treatment of Venereal Disease (syphilis, gonorrhœa or soft chancre) otherwise than by duly qualified medical Practitioners, and to control the supply of Remedies therefor.

1.—(1) In any area in which this section is in operation, a person shall not, unless he is a duly qualified medical practitioner, for reward either direct or indirect, treat any person for venereal disease or prescribe any remedy therefor, or give any advice in connection with the treatment thereof whether the advice is given to the person to be treated or to any other person.

(2) This section shall operate in any area to which it is applied by order of the Local Government Board, or, in Scotland and Ireland, the Local Government Board for Scotland and Ireland respectively:

Provided that no order shall be made in respect of any area until a scheme for the gratuitous treatment of persons in that area suffering from venereal disease has been approved by the Local Government Board, or, in Scotland and Ireland, the Local Government Board for Scotland and Ireland respectively, and is already in operation.

2.—(1) A person shall not by any advertisement treat or offer to treat any person for venereal disease, or prescribe or offer to prescribe any remedy therefor, or offer to give or give any advice in connection with the treatment thereof.

(2) On and after the first day of November, 1917, a person shall not recommend to the public by any notice or advertisement, or by any label or words written or printed, affixed to or delivered with, any packet, box, bottle, phial, or other inclosure containing the same, any pills, capsules, powders, lozenges, tinctures, potions, cordials, electuaries, plaisters, unguents, salves, ointments, drops, lotions, oils, spirits, medicated herbs and waters, chemical and officinal preparations whatsoever, to be used or applied externally or internally as medicines for the prevention, cure, or relief of any venereal disease:

Provided that nothing in this section shall apply to any advertisement made by any local or public authority or made with the sanction of the Local Government Board, or in Scotland and Ireland the Local Government Board for Scotland and Ireland respectively, or to any publication sent only to duly qualified medical practitioners or to wholesale or retail chemists for the purposes of their business.

3.—Penalties: Imprisonment, with or without hard labour, for not exceeding two years, or on summary conviction to a fine not exceeding one hundred pounds, or to imprisonment, with or without hard labour, for a term not exceeding six months.

National Council for Combating Venereal Disease. Meeting at Edinburgh Resolutions—L. i./19,352.

DENTISTS ACT, 1921.

Came into force November 30th, 1922. Expressly restricts practice of dentistry to registered dental practitioners. Under the Act about 8,000 hitherto unregistered dental practitioners were added to the Dentists Register.

No person can now enter the dental profession without going through the dental curriculum and obtaining a diploma or degree. Exceptions are in the cases of registered medical practitioners, registered pharmacists and minor dental work in a public service under conditions approved by the Ministry of Health.

Regulations adopted by the newly constituted Dental Board (obtainable from the office of the Board), 44, Hallam Street, W., post free 2s. 8d.), deal *inter alia* with the keeping of the Register. Persons registered under the new Act include those in practice for 5 of the 7 years prior to July 28, 1921; members of the Incorporated Dental Society and pharmacists who applied for registration showing that immediately prior to that date they had a substantial practice in dentistry.—Refs.: B.M.J. Supp. i./22,19; B M.J. ii./22,283,894,1099,1113, 1199; P.J. ii./22,527.

TRADE-MARKS.

The 1905 Trade Marks Act defined a Trade Mark as follows :—

"A trade-mark shall mean a mark used, or proposed to be used, upon or in connection with, goods for the purpose of indicating that they are the goods of the proprietor of such trade-mark by virtue of manufacture, selection, certification, dealing with, or offering for sale."

It is important to realise that Trade Marks can exist as Common Law Trade Marks. An unregistered trade mark can be protected by a "passing off" action, *i.e.* for an injunction and damages.

A trade mark, which may be registered in 50 Classes, must contain or consist of at least one of the following essential particulars:—

(1) The name of a company, individual, or firm represented in a special or particular manner.

(2) The signature of the applicant for registration or some predecessor in his business.

(3) An invented word or invented words.

(4) A word or words having no direct reference to the character or quality of the goods, and not being according to its ordinary signification a geographical name or a surname.

(5) Any other distinctive mark. But a name, signature, or word or words, other than such as fall within the descriptions in the above paragraphs (1), (2), (3), and (4), shall not, except by order of the Board of Trade or the Court, be deemed a distinctive mark.

We indicate Trade Marks by the ✱ preceding the name of the article and have added *the numbers* thus : T.M. 326021 to each, so far as our searches at the Patent Office have indicated. Having to consult these numerous classes, omissions may have occurred. As the Patent Office Public Index is continually under revision it is possible that alterations may have been made subsequently. We shall therefore welcome information as to corrections for consideration in a future edition.

The utility of the numbers is this—that it enables any person by the payment of a small fee at the Patent Office to obtain information as to the status of the Trade Mark in question—date of registration, date of payment of renewal fees, details of assignment and so on. This information could not reasonably be incorporated in our pages.

Mr. S. W. Woolley, Editor of the "Chemist and Druggist" (London), has done excellent service in showing up the anomalous condition of the law in regard to Trade Marks—particularly in respect of

TRADE MARKS FOR PATENTED ARTICLES.

When an article has been introduced as new and has been first manufactured under a patent, the name by which it is known becomes common property as soon as the expiration of the patent rights put an end to the monopoly in the manufacture and sale of the article, and although the name may, down to that time, have identified the goods with the maker of them, it is no longer available for him as a Trade Mark or Trade Name.

"It is impossible to allow a man to prolong his monopoly by trying to turn a description of the article into a Trade Mark. Whatever is mere description is open to all the world."—*Lord Justice James, in Cheavin* v. *Walker* (1877).

When it is understood that a Trade Mark, by renewal every fourteen years, can be continued indefinitely, and that renewals of the Trade Marks applied to patented articles are made after the expiry of the patent, the extent of the continuance of the monopoly will be realised.

The Patents, Designs and Trade Marks (Temporary Rules) Act 1914 and the Rules made under it with which we dealt very fully in our last Edn., p. 956 *et seq.* were "to continue in force during the continuance of the present state of war in Europe and for a period of 6 months thereafter."

It may be recalled as an important point that certain Trade Marks *e.g.* Aspirin, Lysol, Metol, Urotropin were ***avoided*** (meaning legally invalidated or made of no effect). These words are ***public property*** and the rights which the registration originally gave to the owners have come to an end.

Certain words were, on the other hand, temporarily ***'suspended'*** *e.g.* Salvarsan, Neo-Salvarsan and Novocain.

The **Patents & Designs Act, 1919,** strengthens the provisions for the protection of British Industry in the Act of 1907. The 1919 Act is concerned "for the prevention of abuse of monopoly rights"; if within four years from the date of a Patent, the invention is not worked within the United Kingdom on a commercial scale, or if the demand for the patented article in the United Kingdom is not adequately met and for other reasons, the Comptroller may grant "*licences of right*" (exclusive or non-exclusive) to any applicant on such terms as he (the Comptroller) may decide or may even revoke the patent. Section 11 enacts that the specification for an "invention relating to substances prepared or produced by chemical process or intended for food or medicine" shall not include a claim for the substance itself, except when prepared or produced by the special method or process of manufacture described and claimed (in the specification) or by its previous chemical equivalent. Any applicant is *prima facie* entitled to a licence for a food or medicine *patent.* Registration of assignments, etc., of patents is made compulsory. The term of a patent is to be sixteen years instead of fourteen, and existing patents amd licences are extended for two years accordingly.

The **Trade Marks Act, 1919,** in force since April 1st, 1920, divides the register of trade marks into two parts; part A is to consist of those marks already registered and those hereafter registered under the previous Acts (which, with some amendments, remain in force), part B is to contain a new class of marks, for any mark which has been in use for two years may be registered, under the new Act, unless deceptive or closely resembling a mark already registered. This is apparently intended to permit the registration of many marks which could not be registered under the previous Acts. Registration in part B will, however, only be *prima facie* evidence of ownership; it will never become conclusive, whereas registration in part A is generally conclusive after 7 years. An important new provision is Section 6:—"Where in the case of an article or substance manufactured under any patent.....a word trade mark..... is the name or only practicable name of the article or substance so manufactured, all right to the exclusive use of such trade mark,.....shall cease upon the expiration or determination of the patent," &c. There is also a provision against registration of a "word which is the only practicable name or description of any single word chemical element or single chemical compound as distinguished from a mixture." These two provisions are intended to prevent the abuse of trade mark law.

CONFERENCE ON EMPIRE PATENTS, June 1922, in London. To institute a system of granting patents, which should be valid throughout the British Empire. Need of having an agreement on the definition of the word 'inventor' and the rights of importers to obtain a patent. There is a divergence of practice between the United Kingdom and some of the Dominions. A Commission of legal, technical and business men, and Government officials, necessary. There is a semi-chaotic state of things.—C.D., Aug. 26, 1922.

THERAPEUTIC INDEX
OF
DISEASES AND SYMPTOMS.

Internal Remedies are in Roman type. Vaccines as a general rule are for hypodermic use.

Remedies for local or external use are in italics in a separate paragraph. Where there is only one paragraph the reader should understand the remedies are for internal use unless stated to the contrary.

Some of the medicaments **recently added to the work,** to which special attention is directed, are printed in the reverse manner.

Abortion, Threatened.—Hydrastis, Quinine, Sumbul, Viburnum prunifolium.

Abscesses, general, to abort.—Aconite, Belladonna, Calcium Sulphide, (*e.g. in Stearettes*), *Quinidine Preps.*, Quinine.

Acid Carbolic, Argenti Nitras, B.I.P.P., Colloidal Iodine, Dakin's Solution, Eusol, *Hydrogen Peroxide, Mang. Butyrate,* Staphylococcal Vaccine, *Tincture of Iodine, Unguentum Belladonnæ, Ung. Iodi Intinctum. See also* **Wounds.**

Abscesses, Dental. (*Local use.*)—*Boric Acid Lotion, Dental Solubes* Formosyl, Borated Hydrogen Peroxide, Iodates.

Copper and Zinc Ionisation.

Abscess Liver, Tropical (Internal).—*Antimonials,* Arsenicals, *Emetine Injections, "E.P.I.," Ipecacuanha, Vaccine of Organism if isolated,* Quinine Injections.

Acidity of Stomach.—Aqua Calcis, Ammonia preps., *Aperfine,* Belladonna, Bismuth preps., Bismuth and Pancreatin, *Biscinoid,* Calcii Carbonas, Carbo Ligni, Cerium Salts, *Cremor Magnesiæ, Glyc. Bismuthi Eff.,* Magnesii Carb. or Oxide, *Oleum "Elliott" Caps.,* Potass. Bicarb., Sodii Bicarb.

An ounce of Almond Oil (internally), *q.v.*, first thing in the morning, repeated before other meals if necessary. See also Hyperchlorhydria.

Acidosis—Administer purgative, wash out stomach, then subcutaneous, or better, intravenous injection of Sodium Bicarbonate Solution. Sodium Lactate or Sodium Citrate *per os.*—*Glucose Rectal Injection.*

Acidosis in diabetes, starvation, various poisonings, cyclic and periodic vomiting, etc.—Alkalis, Alcohol. See also **Diabetes.**

Acne.—Acid Camphoric, Arsenic, Brominol, *Calc. Sulphid. Stearettes, Fœxin, Fœxin Extract,* Guaiacol, Hypophosphites, Liquor Auri et Arsenii Bromidi, Liquor Auri et Hydrarg. Bromidi, Ol. Morrhuæ, Omnevit, Phosphorus, Potassii Bromid., Quininæ et Ferri Citras, Sodii Bromid., *Stannoxyl,* Sulphur (and Colloid), *Sulphur Stearettes.* Turpentine in Oil Injection.

Acid Carbolic, Acid Lactic, Acid. Nitric. Baths, Anserin Mutts Medicid., Calaminæ Lotio, Glycerinum Kaolin Aceticum, Hydrarg. Perchlorid Lotio, Ichthyol, Ichthyol-resorcin and Salicylate, Iodates, Isopropyl Alc. Lotio Sulphuris cum Sapone, Quillaia Lotion, Ung. Resorcin Co., Colloidal Metals (Silver, Mercury, Sulphur), 'Cremor Sicc.' preps., Acne Vaccine, also Acne and Staphylococcal Vaccine, Sulphur Colloidal, Stannoxyl, *Sulphur Ung., Sulphur Hypochloritis Ung., Sulphur. Iodid. Ung., Thymol Ung.,* 'X' Rays.

Use plenty of hot water to the face and wash night and morning with soap and spirit and afterwards paint on Calamine Lotion and allow to dry on.—B.M.J. i./17,604.

Acne Rosacea. *Intramine, Finsen Light and "X" rays.*

Acromegaly.—*Pituitary Extract, Thyroid Extract* (guardedly), *Potassium Iodide, and a Mercurial Salt* (*value doubtful except where there is a specific taint*).

Headache of, relieved by *Antifebrin, Phenacetin, Exalgin,* Magisal *Migralgin, Phenazone.*

Sweatings of, by *Zinc Oxide, Atropine or Picrotoxin.*—L. i./09,28. *See also* **Elephantiasis.**

In nearly all cases there is a definite change in the pituitary gland which takes the part of an adenomatous overgrowth. For a useful account of the clinical signs and operative procedure, see J. A. Walton, B.M.J. ii./22,838. See also our page 951.

See also **Ateliosis.**—Therap. Index.

Actinomycosis.—Cupri Sulph., Potassii Iodid., or Sodii Iodid., Salicylates. Thomassen's Iodide Method, *Actino. Vaccine.*

Argent. Colloidale, Iodi Injectio, Sol. Argent. Nit. Injectio 20%, *Cupri Sulphas, 'X' Rays.*

Addison's Disease.—Arsenic, Iron, Phosphorus, Suprarenal preparations. *Adrenalin hypodermically* may increase blood pressure a little.

Adenoids.—Cod Liver Oil, Iodine, Iron, *Liq. Ferro-Manganes. Pept. cum Hæmoglobin, Liq. Iodo-Ferro-Manganes. Pept.*, Syrup Iodo-Tannicus.

Ammon. Chlor. Snuff, Glycerin vel Liquor Ferri Perchlor. Nasal Injection of Tannic Acid, Nebulæ (*q.v.*)., 'X' Rays.

Orris Root Powder and Soap on septum to induce sneezing.

Adhesions, Fibrous, Peritoneal, etc., Injectio Thiosinamin et Phenazoni, Inject. Thiosinamin et Sod. Salicyl.

Adiposity. *See* **Obesity.**

Ague.—*See* **Malaria.**

Albuminuria.—Acid. Gallic., Agmel, Amyl Nitris, *Basham's Mixture*, Ferri Cacodylas, Fuchsine, Juniper Oil, Nitroglycerin. *Vinum Diuretícum, Viscum.*

Significance of albuminuria. *Per se* and as an isolated observation has little significance. In 50,000 fit soldiers protein was found in nearly 6%. Importance of Maclean's urea concentration test.—F. G. Chandler, Pr. July, 1921, p. 33. *Differential Diagnosis, see Vol. II.*

Alcoholism.—Acid Hydrocyanic, Ammonium Chloride, Arsenic, Atropina, Auri Chlorid., Capsicum, Chloral Hydras, Cinchona, Colloidal Gold, Digitalis, Hydrastis, Hyoscinæ Hydrobromidum, Hyoscyamus, Lupulin, Mistura Antidipsomanica, *Mist. Belladonnæ Xanthoxyli et Hyoscyami*, Mistura Ferri Aperiens, Mistura Magnes. Sulph. Co., Nux Vomica, Phosphorus, Picrotoxin, *Pilulæ Capsici Co.*, Quinine Preps., Stramonium, Strychnine, *Atropine and Strychnine hypodermically to keep the patient away from drink; Apomorphine if mad drunk.* For insomnia of: Elix. Chloralamide.

D.E. Stanford Park on treatment of inebriety and drug habit.—L.i./22,691; il./24,491, v. also o r p. 380.

USEFUL OUTLINE OF TREATMENT.

Calomel at bedtime, 'Salts' or Seidlitz in the morning. Acute gastritis is treated by ½ grain doses of Calomel every half hour for 5 hours followed by 'Salts,' Apomorphine hypodermically for acute alcoholism. Nervous patients receive Bromide well diluted *per os* and Strychnine 1/30 grain *hypodermically every six hours.* Suspend Strychnine after six days and give then ½ ounce every hour of the following mixture:—Tinct. Capsici 1 drachm, Liq. Extract of Quassia and Tinct. Ignatia (or Nux Vomica) equal quantities 1½ drachms, Water to 8 ozs.—A. M. Rosebrugh, B.M.J. i./14,704.

Ammon. Chlor. is an antidote to excess.

The following is a useful 'draught' on the morning after a 'big dinner':—Sodii Bic., Pot. Brom. *aa.* gr. 20, Tinct. Card. Co., Tinct. Gent. Co., *aa* 1 drachm. Aq. *ad* 1½ ozs. (Calomel 5 grains if bowels not already loose).—C. D.

Alkalipenia.—*with reference to acidosis, as observed in children.* It was found that a normal adult wants approximately 75 grains (5 Gm.) Sodium Bicarbonate to render the urine alkaline. The urine of an infant will be alkaline after giving 20 to 40 grains. In acidosis approximately 100 Gm. are required to produce an alkaline urine—in severe cases even up to 200 Gm. Over 200 Gm. death ensues. Before the onset of true acidosis there must be a depletion of 20, 30 or 40 times the normal quantity.—A. D. Symons, L. i./22,627.

Alopecia.—Arsenic, Hæmoglobin, Humagsolan, Iron, Pilocarpine, Strychnine, *Thyroid Gland (Standardised) Preps., either Tabs. or Liquor.*

Ammon. Liquor, Amyl Nitrite with Pilocarpine Hair Lotion, Burt's Fluid, *Cantharides preps., High Frequency current, Hydrargyri Oleas, Hydrargyri Perchlor.* vel Subchlor, *Lin. Iodi*, Liq. Carbonis Deterg. 20% Lotion c. Glyc. 10%, *Chrysarobin, Lotio, Capillaris*, Lotio Balsami Peruvian, Lotio Excitans, *Lotio*

Resorcini, Lotio Etheris Comp., Baume Fioraventi, Linimentum Jaborandi, Lotio Resorcin et Ac. Salicyl., Lotio Resorcin, Pilocarpin et Canthar., Unguentum Cadini, Ol. Cadini Aceticum, *Oxygen*, *Petroleum Spirit*, Spiritus Acid. Lactic, 'X' Rays (small doses).

Amenorrhœa.—Actæa and Cimicifugin, Aloes, Apiol, Cantharides, Caulophyllin, Corpora Lutea, Dewees' Mixture, Ergota, Ergot and Apiol Capsules, Elixir Ergotæ cum Ferro, Eupatorii Inf., Ferri Oleas Caps., Gosspyii Rad. Cortex, Guaiacum and Apiol, Iron Salts, Manganesii Oxidum, Ol. Rutæ, Ol. Pulegii, Pil. Aloes et Myrrh, Potass. Permang., Pulsatilla, Savin, Senecio, Tanacetum. *Thyroid Gland* (*Standardised Liquor and Tablets*).

Amœbiasis.—Ipecacuanha or Emetine Injection or "Stearettes" or Salol-coated pills of Ipecac., Emetol, Emetine Periodide, or Emetine Bismuth Iodid. See also **Dysentery.**

Anæmia.—Alginoid Iron, *Arsamin*, Arsenic, *Benzol Capsules*, Cacodylates, Calcii et Ferri Glycerophosphas, *Calcii Fluoridum*, Calcii Hypophosph., Calcii Phosph., *Capsulæ Cruoris*, Chlorophyll preps., *Cholesterin*, Corpora Lutea, *Elix. Gent. Acida. Elix. Hæmoglobin*, Ferri Bromid., Ferri Perchlorid, Liquor Ferri Hypophosph., Ferri Iodidum, Ferri Oleas Caps., *Ferri Oxalas*, Ferri Perchlorid., *Food Preparations* (*new, various*), *Glycerol Glycerophosphatum*, Ferri Phosph., Ferri Sulph., Ferrum Dialysat,. Ferrum Redactum, *Glycerol Glycerophosphatum cum Medulla rubra*, Hæmoglobin preps. and Capsule, Ferrocarnis, *Lecithin Elixir and Emulsion*, Liquor Ferri Albuminati, Liquor Ferri Peptonati, Liquor Ferri-Manganesii Peptonat, *Liq. Iodo-Ferro-Manganes. Pept. Liq. Ferro-Manganes. Pept. cum Hæmoglobin*, Magnesii Peroxidum, Maltolivine, Manganese Citrate, Marrubin, *Malted Glycerophosphates*, Nucleinic Acid, Ol. Morrhuæ, *Omnevit*, Pavimol, Phosphor, Pil Ferri Carb., Pil., Ferri Sulph., Quinine preps., Quinin et Ferri Chlor., Saccharum, Sirop Neurotonique, Sodii Hypophosphis., Spleen Substance Desicc., *Strychninæ Cacodylas*, *Syr. Iodo-Tannicus*, *Syrupus Tann-Iodo Phosphoratus*, *Syrupus Trium Phosphatum*, Tinctura Ferri Pomata, *Trilactine*, *Vinum Tann-Iodo Phosphoratus.*

Anæmia, Pernicious.—*Benzol Capsules*, Mercury, *e.g.*, as Ung. Hyd. Iod. in conjunction with Arsenic.

It is stated that Iron is an absolute poison—the liver already contains excess to draw upon—but arsenic does good.

Investigation of cases treated by blood transfusion, splenectomy, elimination of foci of infection and arsenicals. No evidence that any of these prolonged life.—Work in U.S.A.—B.M.J. ii./18,63.

Repeated doses of Calomel 2 grains, at first twice a week for six weeks, afterwards once a week for further six weeks, and finally once a month. Improvement most marked.—J. C. Ferrier, B.M.J. i./21,932.

Treatment should consist of radical oral sepsis, administration of Hydrochloric Acid, regular use of sour milk, and inoculation with a vaccine made from Streptococci, isolated from patient's duodenum by means of a Ryle's tube.—A. F. Hurst, B.M.J. ii./22,978.

Four gland Tablets used with good effect.—Sir J. Cantlie.

For Blood Counting and Staining see Vol. II.

Anæsthetics by inhalation.—A.C.E., *Acetylene*, Æther (*and with Alcohol and Oxygen, and Gas and Oxygen*), Æthyl Bromid., C.E., Æthyl Chlorid., and with Nitrous Oxide, Æthyl Iodid., Chloroform (*and with Oxygen* and Hyoscine-Morphine), Ethanesal, Ethylene, Nitrous Oxide, Somnoform. *For a "rough sketch" of Chloroform Administration* v.p. 299.

Gas and Oxygen an extremely useful anæsthesia, many cases being dealt with by it which would not stand a more toxic drug.—Sir Crisp-English, B.M.A., L. ii./23,302.

Vernon-Harcourt Regulator, see p. 298; Shipway's App., p. 299.

For treatment if danger arises with Chloroform, see p. 300; with Ether p. 114, with Ethyl Chloride, p. 120.

Ether volatilized by N_2O and corrected by Oxygen advocated by A. F. Erdmann.—Per Pres. Jan. '23,5.

Heart arrest.—Adrenalin by intracardiac injection or intravenously.

Anæsthesia, Intra-Spinal, see Kerocain, Stovaine, etc.

Anæsthetics Local—*Æther*, *Acid. Carbolic*, *Adrenol* (*throat spray*), *Adreucaine*, *Aethyl Chlorid.*, *Alopon*, *Anesthone*, *Anestiform*, *Anestile*, *Apothesine*, *Butyn*, *Benzamine*, *Cocaine* (*and Substitutes*), *Cocaine Ionised*, *Eudrenine*, *Erythrophlœinæ Hydrochloridum*, *Ice*, *Kerocain*, *Menthol*, *Methyl Chloride*,

Papaverine, Paraldehyde (intravenous), Phenolaine, Quinine, Quin-Hydrochloro-Carbamid., Stovaine, Tropacocaine, Tropacocaine Infiltration and Intraspinal Injection, Scopolamine Morphine Injection, also Scopolamine—Morphine—Atropine. Magnesium Sulphate Intraspinal Injection. Stovaine with Dextrin (Tyrrell Gray) also with Strychnine (Jonnesco). Subcutine. Aether-Saline intravenously, Ether in Oil per rectum.

Potassium Sulphate 0·5% added to local anæsthetics for intraspinal injection enhances action.

Anal Fissures. (*Local use*).—*Belladonna Ointment, Carbolic Acid*, Glycerin Aloes, *Ichthyol, Iodoform Suppositories*, Quinine HCl. packing and suppos, *Ung. Conii.*

Analgesics = Anodynes.—Acetanilide, Atropine, Belladonna, Butyl Chloral, Camphor, Cannabis, Chloretone, Cocaine and substitutes, Codeine, Conium, Gelsemium, Hyoscyamus, Hyoscine, Morphine, Opium, Orthoform, Phenacetin, Phenazone. *Ung. Methyl Salicyl. Co.*

Anaphrodisiacs.—Bromides, Iodides, Opium, Belladonna, Hyoscyamus, Stramonium, purgatives.

Aneurism.—Aconite, Amyl Nitris, Calcii Chlorid., Digitalis, Ergotina, *Iodoprotein Tabs.*, Morphine, Nitroglycerin, Potassii Iodidum, Veratrum. *Gelatin Injection.* Diagnosis.—'X' Rays.

Angina Pectoris.—*Acocanthera* (*with caution*), Aconite, Æther, Æthyl Iodid., Alcohol, *Amyl Nitris*, Arsenic, Barium Chloride, Cactus, Chloroform Inhalation Capsules (not with low blood pressure), Digitalis, Digitalin cum Nitroglycerin Tabellæ, Erythrol Nitrate Tabellæ, Hoffmann's Anodyne, Hydrogen Perox., Ibogaine, Mannitol Nitrate Tabellæ, Morphinæ inj. hypod., Nitroglycerini Liquor and Tabellæ, *Papaverine*, Phenazone, Sodii Nitris, Sod. Theobromine-Sodium Iodide, *Tab. Sodii Nitritis Comp.*, Theobromine, *Theobromine Aceto-Salicyl*, Theobromine Sodium Salicylate, Trilactine.

The victim of angina pectoris may have a blood pressure considerably above normal. The failure of Nitrites to give relief is of bad omen.—F. de Havilland Hall, B.M.J. ii./19,496.

Angina, Pain of.—Amyl Nitrite. Carbonic Snow.

Ankylostomiasis (caused by Ankylostomum duodenale).—*Carvacrol, Carbon Tetrachlor, Eucalyptus Oil*, Filix Mas. Ol. Chenopodii c. Thymol, Pelletierine, Podophyllin, *Tablets Betanaphthol and Phenolphthalein*, Terpine, Thymol (not suitable for the old or very young), *Thymol Carbonate.*

Betanaphthol in the treatment of hookworm disease. 397 prisoners in Ceylon (showing on examination an infestation rate of 93·7%) were treated with the drug. "Microscopic cures" effected in only 31·6% after one treatment and 38·1% after second treatment. No untoward effect with 50, 60 and 75 grain doses of the powdered drug.—C. N. Leach and G. E. Hampton, per Jl. Trop. Med., May 1/23,145. See also Sept. 1, 22,285.

Ankylosis. (*Local use*).—Chlorine from Sodium Chloride, also other drugs, by ionisation.

Anorexia.—Calumba, Capsicum, Cascarilla, Chimaphila, Chiratta, Cinchona preps., Gentian, Ignatia, Nux Vomica, Quassia, Quinine, Strychnine, *Syr. Kolæ Comp.*

Anthrax.—Acid. Carbolic, *Camphor Injection, Iodi. Tinct. Inject.*, Phosphorus, *Sclavo's Serum.*

Anthelmintics.—See **Worms.**

Antidotes.—See Chapter; they are also fully referred to in the text; see also list of *Emetics* in this Index.

Antipyretics. See **Fever.**

Antiseptics for Hands, Instruments, etc. (See also Chapter on).—*Acid. Boric, Carbolic, Alcohol*, Bacterol, *Clove Oil*, Diffusol, Ether Soap, *Formalised Gelatin*, Formosyl, Harrington's Solution, *Hyd. Biniod., Hyd. Perchlor.*, Iodine Tincture (*q.v.*), Izal, Listerine, Ol. Sinapis (much diluted), *o-m-p. Cresol*, Perfumed Formosyls, Phenoloid Disinfectant, Tannin in Alcohol, Thymol Disinfectant.

Antiseptics for Wounds.—*Acid. Boric. Lotio and Ung., Acid. Carbolic, Lotio and Ung., Acid. Salicylic, Lotio and Ung.*, Acriflavine, *Alcohol* 75% (*steriliser of skin*) *Alembroth gauze*, Allantoin, Aluminii Acet. Lotio, Anserin Mulls medicated, *Aristol*, Bacterol, Benzoxydol, *Benzoin Co. Tinct.*, Brilliant Green, Bromphenobis, *Chartazine*, Cheatle's Green Spray, Chloramine T., *Collodium*, Colloidal Metals, *o-m.p* Cresol, Dakin's Solution, Diffusol, Eupad, Eusol, Formosyl, *Glycerinium Iodoformi, Hydrarg. Biniod., Hydrarg. Perchlor.*,

Lotio Iodoform, Iodoformi Emuls., Iodoform Wool and Ung., Iodol, Iodine in Spirit, Iodised Carbon, Iodine Colloidal, Izal, Kelly's Paint (Collod. Benzoin), *Liq. Hydrogen Peroxidi, Listerine, Mercuro-Zinc Cyanide, Perchloride Solutes, Petrolei Cerat.*, Phenol and Camph. combined, *Potass. Permang., Resorcin*, Menciere's Solution, Malachite Green (and with Sublimate), Proflavine, *Salol*, see Chapter on Antiseptic Values, Vol. II., and Chapter on *Wounds* in this Index.

Antiseptics, Intestinal.—Acid. Boric, Acid. Carbolic, *Acid Iodic, Aspriodine*, Benzonaphthol, *Bisciniod*, Bismuth Salicylate, Bismutose, *Calcii Sulphid. Stearettes*, Carbo Ligni, Dimol, Ichthyol, Ichthoform, *Ixora, Kaolin*, Koumiss, Mercurials, Myrtillus, Naphthalene, Naphthol, Phenol-Bismuth, *Phenyl-Aspriodine*, Pil. Bism. Sod. Sal. and Salol, Quinine Acetyl-Salicyl. Quinine Salicylate, Salacetol, Salol, *Sedasprin*, Sodii Hyposulphis, Sod. Oleat Co. Capsules, Sulphocarbolates, *Trilactine, Trilactine Milk, Tylcalsin*, Tylmarin, *Tylmarin-Quinine, Tylmarin Sodium, Tylmarin-Thorium.*

Many of these drugs may be prescribed for local action in Stearettes and Formagules. *q.v.*

Antiseptics for the Mouth. Formalin Tablets (Internal). Formosyl Mouth Wash, Hydrogen Peroxide Mouth Washes, *q.v.*, Liq. Antisepticus, Thymaglycin.

Antiseptics, Urinary.—*Acid Iodic* and *Iodates*, Benzoic and Boric Acids, Cysatazol, Salol, Hexamine, Hexamine-Resorcin, Mercurochrome (by urethral injection), Methylene Blue, *Tylmarin*, Uro-hexoids, Vesalvine 'S' and 'B,' see also Cystitis. *Zinc Sulphanilas* (urethral injection).

Antispasmodics.—See **Asthma, Convulsions and Epilepsy.**

Aortic Disease.—Ammon. Carb., Camphor Injection, *Erythrol Nit. Tabellæ*, Ferri Iodid., Ferri Perchlor., Iodides, Nux Vomica, Sodii Salicyl., *Tab. Nitroglycerin et Sodii Iodid. cum Arsen.*—*See also* **Angina Pectoris.**

(Test for Syphilis: Anti-syphilitic treatment.)

Aphonia.—See **Voice, Loss of.**

Aphrodisiacs, see **Debility and Nervous Debility.**

Aphthæ.—Bismuth preparations, Iodine Colloidal, Iodoform, Mineral Acids, Quinine preps., Sod. Bisulphis, Sodii Chloras, *Sodii Sulphis.* Tab. Formalin to suck.

Acid. Boric, Acid. Sulphuros, Alumen, Borax, and Glyc. of, Dakin's Solution, Formaldehyde Pigment, *Iodol, Lotio Nigra et Glycerini, part. æq., Potass. Permang., Sodii Chlorinat. Liquor.*

Appendicitis.—Combined use of Belladonna and Salicylates (*see* Tinct. Bellad.).

Purgative *e.g.*, Castor Oil or Calomel 2 gr.; Ice bag, Magnesia, Bismuth Subnitrate; Mercurial Ointment to the flank, Codeine if pain excessive, diet and regulation of bowels.—Robin's treatment. *Glycerin Bellad. and hot fomentation alternately.* Move the bowels not before the 4th or 5th day and not until the 7th if abscess forming, when Calomel and a Saline Aperient should be given if necessary. A Saline mixture with Hyoscyamus is useful.

Iodine for skin sterilisation prior to operation.

Appendicitis, Threatened.

For incipient, *Elixir Agrimoniæ Co., Trilactine.*

Why and how to preserve the appendix.—Keetly, L./09,1.

'Rest, starvation and Morphine' will probably clear up the typical mild case in two or three days. Some say on no account opium.

300 cases of appendicitis.—Sir G. T. Beatson, Glas. Med. Jl., Nov., 1912.

Nasal sinus infection as a causal factor in appendicitis.—P. Watson-Williams, Pr. April, 1921.

Basuto negroes in Orange Free State do not suffer from.—B.M.J. i./23, 1116.

Arterial Tension, Raised.—Aconite, Antimonial preparations, Potass. Iodidum, Pulv. Sodii Nitritis Comp., Veratrum Viride.—See also **Arteriosclerosis, Blood Pressure** and **Vasodilators.**

Arterial Tension, Lowered.—Pituitary Gland Preparations raise tension of the blood vessels.—*See* **Cardiac Tonics.**

Arteriosclerosis.—Adrenalin, *Aspriodine*, Benzoates, *Camphor*, Citrates, Erythrol Nit. Tabellæ, *Iodoprotein, Iodogluten, Omnevit*, Peptone, Sodium Hyposulphite, Sodium and Magnesium Sulphates, *Syrupus Iodo-Tannicus*, Iodolysin (Inj.), Thyroid preps., *Trilactine*; Depressor Agents, *e.g.*, Chloral Hydrate, Hippurates, Potassium Iodide, *Nitroglycerin Tabellæ, Talellæ Sod.*

Nitritis Co. For pre-sclerosis Diuretics, finally Theobromine and Digitali Strophanthus and the Hippurates give good results. Vasodilators shoul not be used in advanced cases.—L. i./13,1315.

The most useful drugs are Amyl Nitrite, Nitroglycerin, Erythrol Nitrat and Sodium Nitrite.—W. Lyne Blight, L. i./15,1167.

Arteriosclerosis and Bright's disease are too closely associated to sugge a chance coincidence and many observations point to the conclusion tha one or more of the causes of Bright's disease are concerned in the productio of arteriosclerosis.—Geoffrey Evans, Pr. Jan. 1922, p. 38.

Nature and Classification of types of arteriosclerosis.—Goulstonian Le tures, Geoffrey Evans, B.M.J. i./23,454, 502, 548; L. i./23,579.

Arthritis—See **Gout and Rheumatism.**

Arthritis Deformans.—Iodine Ionised. Peptone intramuscularly.

Treat as in early phthisis—Cod Liver Oil, Creosote, Guaiacol, tonics, hæma tinics. Later, Iodine and Iodides.—C. W. Buckley, Pr. June 22/412.

Ascarides.—See **Worms.**

Asthma.—Try to find causes.—Renal, etc.: sensitiveness to protein. Adrenalin subcut., Æthyl Iodid., Amidopyrin, Ammon. Brom., Amy Nitris, Antimony, Arsenic, *Aspriodine*, *Atropine Valerianate*, Belladonna Bromides, Caffeine, *Caffeine Tri-Iodide Pil. (Billimoria)*, *Calcii Chlorid* (q.v., Cannabis, Chloral Hydras, Chloroform, Coca and Cocaine Salicylas Codeine, Erythrol Nitras, Euphorbia Peplus, Euphorbia pilulifera, *Ext. Grindl Co.*, Grindelia, Hydrarg. Subchlorid., Hyoscine, Iodinol, Iodoprotein Tabs Jaborandi, Lobeliæ Tinct. and Tinct. Ætherea, *Mannitol*, Menthol, *Naphtho Nitroglycerin*, *Papaverine*, Paraldehyde, *Peptone Injections*, and *per os*, Physos tigma, Pilocarpine, Potass, Iodidum, *Rutæ Confectio*, *Salol*, Sedasprin, Sodi Iodid. and intravenously, Sodii Nitris, *Tabs. Sod. Iodid. and Sod. Nit. com bined*, Solanine, Stramomium, *Spiritus Grindeliæ Co.*, *Strontii Iodid.*, *Tabell Antiasthmaticæ*, *Tylcalsin.* Tuberculin T.O.A. stated to have efficacy. A emetic may afford great relief.

Aspirin relieves some cases; in others unsuited.—B.M.J.E. ii./22,33. I dries the mucous membrane of the nose and therefore possibly aborts attac by reducing bronchial secretion.—Clin. Jl. Jan. 17/23,35.

Acid. Sulphuros. Vapor, Adrenalin—as spray. Oxygen has been injected Vaccine B. Influenza, Pneumo., Strepto., M. Catarrh., or M. Paratetrag acc. to predominant Organism present, preferably Autogenous.

Ammonii Bromidi Vapor, *Arsenical Cigarettes*, *Chloroform Vapor*, *Coca c Eucalyptus leaves smoked*, Compound Asthma Fluid (as spray), *Cubeb Cigar ettes*, Nim smoking (in India), *Ozonic Inhaler*, *Potass. Nit. fumes*, *Pulvis Lobeli Co.*, *Pyridine*, *Stramonium fumes*, Syr. Pilocarp. et Pot. Brom., *Vapor Conina*

Grindelene does good in severe attacks of asthma. For all chronic con ditions nothing so good as a combination of potassium iodide 5 grains, an magnesium sulphate 1 drachm, in 1 ounce of water thrice daily, 2 hours p.c.—E. Jepson, B.M.J. ii./17,650.

A toxæmia due to overcrowding.—James Adam, B.M.J. i./18,113.

Adrenalin 5 to 10 minims injected three or four times a day good. Begin when the breathing is pretty bad.—B.M.J. i./16,36.

Patient's own blood 5 to 10 Cc. subcutaneously in asthma and in migraine —C. H. Wildish, B.M.J. ii./21,598.

Horse Serum (*q.v.*) is contraindicated in asthmatics.

Asphyxiating Gas.—*See* **Antidotes to Poisons** at end.

Ateliosis or Lorain's Disease.—This condition may be regarded as th exact reverse of gigantism. It occurs generally early in life. The patien remains small and stunted and never arrives at full development. Case have improved after the pituitary gland has been entirely removed.—J. A Walton, B.M.J. ii./22,839.

Auricular Fibrillation.—Digitalis, Quinidine. See also Cardiac Tonics

Aural Discharge.—Hexamine (?), *Potassii Cantharidas* (*q.v.*).

Trichloracetic Acid for closing of perforations.

Bacilluria (B. Coli).—*Hexamine and Sod. Phosph. Acid* (separately) *Vaccines*, make urine alkaline, *e.g.* with Pot. Bicarb. or Sod. Cit.

Balanitis (*Local use*).—*Lotions of Lead Acetate*, *Zinc Salts*, *Silver prepara tions*, *Tannin*, *or Zinc Oxide Powder.*

Basedow's Disease—See **Exophthalmic Goitre.**

Bed Sores. (*Local use.*)—*Acid. Tannic*, *Alcohol*, *Allantoin*, Anserine Mull medicated, *Argent. Nit. in Nitrous Ether solution*, *Glycerin*, Glycerin Aloes

Iodoform Gossyp. and Ung., Iodine Colloidal, *Peruv. Bals.*, Perfumed Formosyls. *Tannin, Iodoform and Starch Powder, Resorcin*, Sphagnum, Symphytum Preps. Ung. Rusci Co.

Beri-Beri.—Extract. Oryzæ Liq., Rice Bran, Omnevit, *Phaseolus*, Strychnine. For routine treatment *v.* Beri-Beri, Vol. II. *See also* **Accessory Food Factors** in this volume.

Bile, Deficiency of.—Ammon. Chloride, Bismuth and Opium, Chirata, *Colalin*, Fel Bovin, Hepatic Stimulants and Antiseptics, *e.g. Elix. Gentian Acidum*, Salol, Hydrarg. cum Creta, Pancreatised Milk, Sodii Glycocholas, Sodii Phosph. Efferves., Sodii Sulph. Efferves., Sodii Salicylas, Taraxacum.

There are only two substances known which are really cholagogues; bile itself and Sodium Salicylate.—P.J. ii./21,490.

Bilharzial Disease.—Antimony Pot. Tart. intravenously, also Antim. Soda Tart., Antim. Ox. Inj., Emetine Periodide, Emetine Injection, Hydr. Perchlor., Methylene Blue, Thymo-benzene.

Advances in knowledge of.—N. H. Fairley, L. i./19,1016.

Disease prevalent in China (10,000,000 infected), Africa, S. America and Japan. Estimated that of 6 million cases in Egypt over 5 million could be cured by Antimony.—J. B. Christopherson, L. i./24,1071.

Intestinal bilharziasis is threatening to destroy the vitality of the inhabitants of the W. Indies, both white and black. The mollusc which serves as the intermediary host is one of the Planorbidæ, *sp. antiguensis*, Reeve, found in streams and pools. S. B. Jones, Jl. Trop. Med. Aug. 1/23,254.

Biliary Concretions.—See Gall Stones.

Biliousness.—Calomel, Chirata, *Colalin*, *Elixir Gentian Acid*, Euonymin, Iridin, Leptandrin, Podophyllin, Sanguinarin, Seidlitz Powders, Sodii Phosph. Efferves., Sodii Salicyl, Sodii Sulph. Efferves., Sodio-Magnes. Sulph. Eff., *Taraxacum Cocoa.*

Bites and Stings (Insects,—Mosquitoes, etc). (*Local use.*)—*Ammonia*, *Cocaine*, Emp. Bellad., *Eucalypt. Ol.* (to ward off), Formalin rubbed in, Formosyl, Hydrogen Peroxide, *Moskitin*, Ol. Betulæ (with Olive Oil), *Onion Juice*, *Phenol*, Pulegii Oleum, *Sodii Bicarb.*, *Spiritus Chloroformi*, *Thymol*, *Vinegar.* Citronella Oil with Carbolic Acid good in warding off mosquitoes.

Mag. Sulph. Sol. 1 in 20. Rub the skin with it to *keep off* insects.

Cod Liver Oil has been found to have a specific toxic action on all flies and upon mosquitoes and ticks. It destroys all the flies that it even touches Sprinkled on the surface of water it is more effective than Petroleum in the destruction of larvæ.—Lang, P.J. i./14,593.

The wasp sting poison besides its toxic effect on the heart diminishes the coagulability of the blood. Calcium lactate in 20 grain doses two-hourly and Cardiac stimulants effective.—P.J. ii./13,559.

Scorpion Anti-venom, method of preparation.—Brazil Mem. Inst. de Butantan. Vol. 1, No. 1, p. 47—52, per T. D. B., Vol. 17, 1921/129.

Viper Bites.—Calc. Chlorid. intravenously. *See also* **Snake Bites.**

Fly Prevention.—The following have been advised for destruction. For **rubbish heaps**, etc., Chloride of Lime, Sulphate of Iron either powdered or in 20% solution, Borax, Colemanite (crude Calcium Borate), Slaked Lime, Potassium Permanganate. For *use indoors*, Formalin, Alcohol and water. As deterrents, Pyrethrum, Paraffin, Cresol, Carbolic Acid. For spraying outside walls or canvas of hospitals, etc., a solution of Sodium Arsenite 1 lb., Honey 2 lbs., Treacle 2 lbs., Water 2 gallons. Use in the evening or early morning. Another formula is Commercial Formalin 1 ounce, water ½ pint, milk ½ pint. Fly Exhibition, Zoological Gardens, C.D. June 5/1915.

To kill flies a 1% solution of Sodium Salicylate is better than Formalin. Of the latter 1·25 to 2·5% of *Commercial Formalin* is the best strength.

Formaldehyde as a poison for house-flies. Efficacy stated to be due to its freedom, when exposed, from Formic Acid, and to a less extent from Methylamine. Formula recommended: 40% Formaldehyde 5, Lime Water 50, Sugar 2·5, Water 42·5. Should be exposed in a trap protected from air, and the prevention of flies falling in, thus making it acid, is advised. A blotting paper trap is shown.—Lloyd, T.D.B., Vol. 17, 1921/123.

The Minnesota Fly Trap is useful. Burning pyrethrum or vaporising Cresol (½ oz. in a moderate sized room) will drive flies away.—B.M.J. i./15,1006.

Berlece's Solution.—Sodium Arsenite 20 Gm., Treacle 100 Gm., Water 1 litre. Steep grass in this and hang it up.—B.M.J. i./15,1006.

Powdered Hellebore (Veratrum Album and V. Viride) ½ lb. to 10 gallons of water applied at the rate of this amount to 8 bushels of manure is an effective larvicide. Has no injurious effects on the manure or plants.—U.S. Dept. of Agriculture, L. ii./15,559.

Insectifuge.—To prevent flies from settling on man and horses.—Pyridine 1, Thymol ½, Safrol 5, Oil of Birch Tar 5, Sperm Oil to 100. The Birch Oil and Safrol mask the odour of Pyridine. Does not irritate the skin. A small quantity to be smeared on the temples, behind the ears and on the head or on leather of harness.

Kerosene is also effectual.

The following Spray Solution should be useful:—

Naphthalin 10, Phenol 10, Camphor 5, Lemon Oil 5, Thyme Oil 2, Lavender Oil 2, Savin Oil 2, Methylated Spirit to 500.

Aloes is a local sedative as in Friar's Balsam. A saturated solution in Tincture of Tolu is good against insect bites.—F. W. Cock, B.M.J. ii./18,256.

Flies dislike the colour *blue*. Use it as much as possible to ward off—especially as a preventive of acute poliomyelitis.—B.M.J. ii./21,230.

Potassium Cyanide has been used to kill larvæ in pools. *See also* **Malaria** Chapter, Vol. II.

Jelly Fish Stings.—*See* p. 692.

Scorpion Stings.—*See* **Snake Bite Lancets.**

Blackwater Fever.—Eff. Saline, *Intravenously Sodium Chloride*, *Quinine*, *Digitalis*, Sternberg's Mixture, *Strychnine*, Cholesterin, Meth. Blue intrav.

A disease of metabolism. Writer of the opinion that hæmoglobinuric fever is a disease of metabolism, the final stages of which, resulting in 'blackwater,' are intensely influenced by any process of pyrexia coincident with it or preceding it.

Treatment.—Keep patient warm, sponge with warm water; in case of pyrexia, sponge with cold water, with Vinegar and Lime Juice added, keeping the brain cooled by compresses. On signs of cardiac failure small doses of champagne or brandy and soda water given—soda water could be taken *ad lib.* Warm blanket baths for delirium or rising temperature. A mixture containing the following has been used with good results: Spirit of Nitrous Ether, Potassium Bicarbonate and Potassium Nitrate. In case of bad malarial history or anæmia without such, 1 grain doses of Quinine should be given in addition, alternating with mixture, as soon as stomach can stand it. Suggests trial of Thyroid to stimulate lymphoid system.—G. Rome Hall, Jl. Trop. Med., April 16/23,120.

Presence of spirochætes in blood of two Europeans suffering from blackwater fever. Experiments on guinea-pigs showed that disease can be transmitted by means of blood or liver extract—guinea-pigs died seven days after inoculation.—M. Blanchard and G. Lefrou, per Jl. Trop. Med., Jan. 15/23,33.

A case of, at Hull. Patient had resided in the Belgian Congo and had had several attacks of malaria. On admission to nursing home semi-comatose, delirious, in prostration, with frequent vomiting, marked jaundice and with passage of almost black urine. Rectal Salines, Camphor in Oil, Strophanthin, Tinctura Iodi, Bismuth, Adrenalin (to stop vomiting). One should watch the heart, give fluids, stop vomiting, watch for complications, especially suppression of urine, syncope, hyperpyrexia. Quinine should not be given, as it may increase the hæmolysis.—Stanley E. Denyer, Clin. Jl., Oct. 3/22.

See also Vol. II., special chapter on.

Blastomycosis.—Potassium Iodide a useful drug.—A. Castellani, L. i./20, 943. *See also* Vol. II.

Bladder.—*See* ***Albuminuria and Cystitis.***

Bleeding of Gums.—*Magnes. Lactas. See also* **Gums Inflamed and Spongy.**

Bleeding, to arrest—*See* **Hæmorrhage** and **Epistaxis.**

Blepharitis.—*See* **Conjunctivitis.**

Blistering Applications.—*Acetum*, *Collodium*, *Emplastrum and Liniment of Cantharides*, *Capsicum preparations.*

Blood Pressure, to Increase.—Pituitary Extract seems to have effect; next in potency is Caffeine. Calcium Lactate moderately effective and Strychnine disappointing. Digitalis to be reserved for cardiac cases.—L. i./11,663.

Atropine, Camphor, Cotarnine, Digitoxin, Ergotoxine, and Strychnine are of no value. Adrenalin is dangerous, and should always be used with caution

or this purpose. Physostigmine is effective, but as it gives rise to nausea, omiting, and faintness, it should not be employed in cases of hypotension. ituitary extract has no pressor effect.—A. Watson, Pr. Apl. 1915.

Blood Pressure, to Reduce.—

(i.) **Heart Depressants.**—Aconite, Arsenic, Mercury, Potass. Salts, Quinine, Salicylic Acid, Veratrum Viride.

(ii.) **Vasodilators.**—Amyl Nitrite and Nitrites, Arsenic, Mercury, Quinine, Salicylic Acid.—B M.J. ii./06,1455.—See also **Vaso-dilators** and **Angina.**

(iii.) **Purgatives.**

High blood pressure, prognosis in. The Tycos manometers best.—A. Graham-Stewart, Pr. Aug. 1921, p. 183.

Raised blood pressure. The nourishment of the cardiac muscle is conditioned by the blood pressure in the aorta. A *plus* pressure often means increased cardiac vigour. A *minus* pressure often entails cardiac malnutrition. A *plus* should not always, as a matter of routine, be taken as harmful. *All* high blood pressures are not evil.—P. M. Chapman, Pr. Jan. 1921.

Blood, to increase coagulability of, see List, p. 267.

Boils and Carbuncles.—Acid. Sulph. Dil., Alkalis, Arsenic, Biscinoid, Calcii Lactas, Calx Sulphurata, Ferri Perchlorid., Hypophosphites, *Iodates*, Fæxin, Manganese Colloidal injected, *Mang. Butyrate*, Nuclein, *Ol. Tereb. in Oil Injection*, Stannoxyl, Sulphides, *Sulphur Stearettes*, Sulphurous Waters, Syr. or Pil. Sulphatum, *Trilactine*, Yeast, Streptococcal, or Staphylococcal Vaccine.

Acidin : An albumen-HCl compound found useful.

Argent. Nit., Belladonnæ Glycerin (as pigment and on poultices), *Carbolated Camphor*, Cataplasm Salicyl. Co., Cremor sicc. preps., Argent Oleas, Bismuth Oleas, Barii Oleas, Eupad, Kepad, Hydrog. Perox., Glyc. Acid. Carbolic, Borated Hydrog. Perox., Iodo-Acetone, Iodine Colloidal, Liq. Sodæ Chlorinat. Diluted, *Linimentum Atropinæ*, Lysoform, Methysal Balm, *Opii. Ext.*, Pot. Permang. Pencils, Sphagnol, Stanni Oleas, Thorii Oleat. Ung., Radium.

Subcutaneous injection in the abdominal wall of 10 Cc. Antistreptococcal Serum. Improvement rapid and complete, without destruction of tissue or scarring.—B.M.J. i./24,766.

Potassii Tart. Acid has been used as a dressing in Carbuncle.

Botulism.—A form of food poisoning described by Van Ermengem in 1895. Symptoms correspond closely with those in so-called sausage poisoning met with in Germany and other countries where sausages and ham are eaten in an imperfectly cooked condition. Résumé of knowledge on, see B.M.J. i./18,511. Microscopically the *B. botulinus* is a straight rod shaped slightly motile organism producing spores and not unlike *B. anthracis* in appearance.—J. Stanley White, P.J. i./18,222.

Botulism—cases of so-called—indistinguishable from types of *Polio-Encephalitis* or more accurately Meningo-myelo-encephalitis. Exemplified in epidemics of the Heine-Hedin disease.—F. G. Crookshank, L. i./18,699, see also C. H. Melland, B.M.J. i./18,559, also Wilfred Harris, L. i./18,568.

The first appearance of botulism in Great Britain was in the Loch Marce food (sandwich) case. Bacillus Botulinus, being an aerobic could grow in a sealed tin of food, the taste and aspect of which would not be altered. —B.M.J. ii./22,481.

Botulinus Antitoxin.—Available from the Ministry of Health at various centres.

Dose.—Only large doses will save acute cases. Intravenously, dose, 20 to 50 Cc., previously warmed to body temperature, and injected very slowly. May be repeated daily, if necessary. To be used immediately upon appearance of symptoms, also prophylactically for persons who have consumed the suspected food 10 Cc. intramuscularly, to be followed by larger doses intravenously, if symptoms appear. Risk of serious symptoms from horse serum must be recognised. If such risk is likely, a preliminary dose of 0·5 Cc. of the antitoxin should be given subcutaneously.—B.M.J. ii./22,604; L. ii./22,732.

For the Paisley outbreak of milk poisoning due to *B. Aertrycke* see B.M.J. ii./22,728 and Vol. II.

Botulism. Outbreaks in U.S.A. Patients were freely purged and received Potassium Permanganate internally.—B.M.J. i./22,893.

Doubt as to whether B. Botulinus is responsible for such outbreaks.—F. G. Crookshank, *ibid* 974.

Bacterial food poisoning. Outbreak in Ireland due to consumption o infected milk.—W. D. O'Kelly, per Jl. Trop. Med., Mar. 15/23,95.

Bacillus botulinus infection of canned spinach. 0·5 Cc. of infected spinac juice *per os* killed guinea pigs in 18 hours. Of 174 samples taken from sus pected lots bacillus botulinus (Type A) was found in 6.—S. A. Koser, pe Jl. Trop. Med., June 15/22,208.

Foreign metallic substances in tinned foodstuffs. Danger of electrolysi The 'couple' here is tin-iron, and, in many instances, Sodium Chloride, good electrolyte, is present.—W. M. Willoughby, L. i./23,255.

Brain. Sudden Cerebral Lesions.—If gouty—*Lithia, Potash wit some diuretic, Nitrous Ether and Spirit of Juniper to which some Digitalis* ma be added—more if thrombosis is suspected than if hæmorrhage is probable

If thrombosis be present, reduce blood coagulability, *e.g.*, by lemon juice (*cf.* p. 267). For hæmorrhage, chalk in a little suitable acid, *q.s.* to dissolve to increase the tendency to clotting. *Calcium Lactate* or *Chloride* best if pro curable in time. *Arsenic* hypodermically, *e.g.*, $\frac{1}{5}$ gr. *Sodii Arsen.* in a littl water.—Gowers.

Breast, Inflammation of.—All Antipyretics.

Belladonna Ext. Glycerin. and Linim.

Breath, Fetid.—*Acid. Salicylic, Calcii or Pot. Permang., Camphora*, Cremo Magnesiæ, *Creosoti Vapor*, Eff. Potass. Ap.c. Sulphocarb., *Formosyl Mouth Wash, Myrrh with Borax Tincture*, Formalin Tablets to suck, *Thymaglycin.*

Bright's Disease. See Nephritis.

Bromidrosis.—Potassium Permanganate Wash. Perfumed Formosyls

The following, described by Thin in 1880, said to be invariably curative.— Thoroughly wash the feet, dry and dust with Boric Acid Powder, then pu on a pair of socks which have been steeped in a saturated solution of Bori Acid and dried. Shoes must also be powdered inside with Boric Powde Each day soak the feet twice for 10 minutes at a time in Boric Acid Solutio and continue as above.

Glycerin well spread over the soles and toes before putting on the socks— repeated as required. Successful. Prevents formation of noxious products Swab with glucose (*q.v.*).—T. H. C. Benians.

See also **Perspiration, Offensive.**

Bronchiectasis.—Acid. Sulph. Dil., Creosote Inhaler. See also **Bron chitis.**

Bronchitis, Acute.—Aconite, Æthyl Iodide, Ammon. Acet. Liquor Antim. Tart., Apocodeinæ Hydrochlorid., *Atropine Methyl Bromide*, Codein Jelly, Glycaphorm, Hexamine, Ipecacuanha, Ol. Cedri Atlantic, Oxygen *Papaverine*, Squill preparations, Vesalvine 'S.'

Vapor Benzoin, Camphor or Eucalyptus, Counter Irritation, Ol. Succini.

Ol. Eucalypt. has been injected with Olive Oil.

Bronchitis, Chronic.—*Acid. Nit. dil. and Inhalations*, Allium preps. Ammon. Carb., Ammon. Chlorid., Apomorph. Hydrochl., Aspriodine, Ben zoates and Benzoin, Tinct., Caffeine Periodide, *Calcii Sulphid., Cyperi Rotund Caps. or Mist.*, Cimcifuga, Codeina Cough Jelly, Creosote, Dionin, Eucalyptu Oil, Euphorbia, Grindelia, Heroin, *Iodoprotein Tabs.*, Ipecacuanha, Magisal Morphine preps., Morrhuæ Ol., Mutton Bird Oil, Piscidia, *Potass. Cyanidum* Potass. Iodid., Prunus Virginiana, Pulsatilla, Scilla, Senega, *Inf. Polygala Compositum*, Syrup. Picis cum Codeina, Syrupus Picis Liquidæ, Tar, *Terpine Di-iodide*, Terebenum purum, Terpin Hydrate, Terpinol, Tolu Balsam, Tyll calsin and Tyllithin. *Vaccine of organism present, e.g., Pneumo* B. Septus B. Influenza, etc., preferably autogenous.

Antimony and Opium, Tinct. Camph. Co., and with Ipecacuanha. If much bronchial spasm and tough expectoration give decalcifying agents—Potass or Sod. Cit. Later tonics.

Vapores.—Acid. Carbolic., Acid. Sulphuros, Benzoini Camphoræ, Creosoti, Cyllin, Terebeni, Iodi, Croton Ol. Linim., Iodi Linim., Ethyl Iodide, Guaiacol Nebulæ, *q.v.*, *Oxygen* inhaled.

Bronchial Secretion is increased by:—Alkalis, especially Carbonate and other salts of Ammonium, Antimony Salts, Apomorphine, Benzoin, Camphor Iodine, Ipecacuanha, Jaborandi, Peru Balsam, Quillaia, Senega, Squills Sulphur, Tar, Terebene, Tobacco, Tolu Balsam, Turpentine.—H.W.

Bronchocele. *See* **Goitre.**

Broncho-Pneumonia and capillary bronchitis in infants. Mist Paraldehyde and Potass. Iodid. Whisky in small doses.

Bruises. (*Local use*).—*Arnicæ Tinct.* (*well diluted*), *Calendula*, *Hamamelis*, *Hydrastis Tinctura*, *Lot. Plumbi et Opii*, *Hazel Foam*.

Bubo. (*Local use.*)—*Chlori Aqua*, *Hydrarg. Oleat.*, *and cum Morphina*, *Hydrarg. Ung.*, *Hydrogen Peroxid.*, *Mercurochrome*.

Burns and Scalds (*Local use.*)—*Acid. Boric Ung.*, *Acid. Picric and Wool*, *Actol*, Alcohol, Allantoin in dressing, Anserine Mulls medicated, *Calamin. Lotion*, *Chartazine*, *Chloretone* 10% *Ointment*, *Coccainæ Ceratum*, Cremor Sicc. preps., Fæxin poultice, Glycerin as an application (good), Hyd. et Zinc Cyanid. Ung., Iodised Phenol, Mastiche Benzol, *Iodoform*, *Lanolin*, *Lini Ol. cum Aqua Calcis*, Picric Acid (strongly recommended), Scarlet 'R.,' *Thymol Ung.*, *Vaseline*, *Zinci Oleat. Ung.*, *Zinci Ung.*, *Hazel Foam*, *Velekmann's Solution*, Zinc Peroxid.

Thorough antiseptic cleansing of the affected part and thereafter dusting with equal parts of Boric Acid and Bismuth Carbonate (not nitrate).

Burns 'X' Ray, see "Radiology."

In burns of the first degree, wet Picric Acid dressings gave much the best results and in burns of the second degree perfectly satisfactory results. Boric Acid baths gave good results in burns of the second degree and Ichthyol Ointment in burns of the third degree.—L. i./12,110.

Paraffin preparations, *e.g.*, that known as 'No. 7' and the proprietary Ambrine are melted and sprayed on to act as an impervious protective.

Burns (cordite, etc.) in the Jutland battle treated with an oil consisting of Menthol 2 grains, Eucalyptus Oil 3 minims, Carron Oil to the ounce, *not* as a dressing but as an occasional application with cotton wool. Sponge the part with saline solution to remove pus.—W. M. Ash and C. P. G. Wakely, L. ii./16,56.

Burns with Liquid Phenol.—The following did well:—Sponge with strong washing Soda (*e.g.*, 1 in about 5)—dilute Sodium Hydrate Solution might be better—cover very thickly with Ung. Acid Boric and Ung. Zinc. *p. æq.*, wrap in lint and bandage.—W. H. M.

Calculi, Biliary.—Alkalis, Ox Bile, Oleic Acid, Sodii Benzoas, Sodii Bicarb., Sodii Glycocholas, Sodii Oleas, Soap, *Caps. Sod. Oleat. Co.*

Calculi, Urinary.—Ac. Acetic. Dil. Douche, Alkaline Carbonates, Ammon. Benz. and Phosph., Aqua destillata, Calcis Aqua, -Mineral Acids (for Phosphatic), Piperazina, Potass. Citras, Sodii Benz. and Hippuras, Sodii. Phos. Acid, Triticum.

Detection of by 'X' Rays, *q.v.* Examination of *vide* Vol. II. The following draught saved a doctor's life.—Tinct. Hyoscy. ½ drachm, Chlorodyne 20 minims, Liquor Potassæ 25 minims, Aq. Camph. ad 1½ ounces. A jagged calculus was passed.—C.D.

Papaverine Sulphate 5 Cc. of 2% Solution injected through catheter has expelled

Bladder irrigation with 15% Hydrochloric Acid (Caution: very strong!) for calculus. Patient could retain 50 Cc. for ½ hour.—B.M.J.E. ii./21,6.

Cancer (*for Palliative Treatment*).—*Alnus Glutinosa*, *Arsamin*, Arsenic preps., Calx Sulphurata, Chelidonium, Chloral Hydras and Opium preps. (as sedatives), *Cinnamic Aldehyde Caps.*, Condurango, *Elixir Antimonii Cinnamicum*, *Ext. Violæ Liq.*, *Liq. Violæ Glucosidi*, Magnesium Carbonate or Chloride large doses, *Neolyse*, *Sodii Cinnamas*.

For Palliative Local Use.—*Acetone*, Acid. Acetic Glacial, *Acid. Arsenious*, *Acid. Carbolic.* (*caustic*), *Acid. Carbolic. Glycerin*, *Acid. Chromic.*, Acid. Lactic, *Acid. Nitric Fumans*, *Acid. Sulph. Fumans*, *Acid. Salicylic. cum Oleo*, Benzole Injection, *Coley's Fluid*, Colloidal Copper, Colloidal Selenium, *Cupri Oleatis Emplastrum*, *Ovules and Bougies*, Eusol Injected, Fibrocoumarin and Comps., Formalin plugging and injection, *Hydrarg. Nit. Acid.*, *Liq. Hydrog. Perox.* (*in inoperable uterine*), *Injectio Antimonii*, *Inject. Antimonii Cinnamica*, Inj. Bismuth Carb. (see Radiology), Iodic Acid, *Iodinol*, Iodo-Acetone, *Iodoform. Local application of Arsenic* (*Trunecek*), *Lead*, *Colloidal*, *London Paste*, *Methyl Violet*, *Morphine*, *Morphinæ Oleat.*, *Oxygen injected suggested*, *Quinin æ Hydrochloridi Injectio*, *Liquor Potassii et Sodii Hypochloritum*, Magnesium Salts, Neolyse, *Quininæ Salicylas*, *Radium*, *Resorcin*, Secondary Radiation from Silver, *Sempervivum Tect. Succ.*, Sodium Orthocoumarate, *Sodii Phosphas Acid. with Hydrochloric Acid*, *Symphytum Cataplasm*, *Tarax. Ext. Liq.*, Thoriac Comps., Thymus Gland, *Thyroidectomy*, Ung. Thorii Oleat., Uranium Salts, *e.g.*, Oxide as Dusting Powder, Tylmarin-Thorium, Ung. Antimonii(?), Vaccine

M. Neoformans, *Vienna Paste, Viola Odorata, 'X' Rays, Zinci Chlorid, and Pasta*, Zinc Mercury Iontophoresis.

Drage's results and opinions on treatment with Cinnamates, Coumarates, Tylmarin, and Colloidal Copper, *v.* p. 29, *et seq.*, and 379.

Cupri Glycinas, also Copper Alanin, *q.v.*, have been suggested for trial.

Cocaine. Cancer sufferers tolerate large doses—diagnostic? *Vide idem.*

Goat serum used in inoperable cancer. The goat is considered by Veterinary Surgeons to be immune to cancer. Six cases. Doses from ½ to 6 ounces—the former intramuscular into the buttocks, the latter intravenously. Pain relieved. Action of Goat Serum is probably by attacking the outskirts of the advancing growths, retarding or preventing their advance into normal tissues. A sufficiency ought to lead to shrivelling up of the tumour.—A. Wilson, B.M.J. i./15,155.

For Diagnosis, *vide* **Cancer**, Vol. II.

Basuto negroes in Orange Free State do not suffer from.—B.M.J. i./23, 1116.

Pituitary prolongs patient's life in cancer. It cuts off blood supply from the growth.—Per Pres. Jan. '23,13.

Diet free from fat soluble vitamin "A" tried. It was thought that malignant cells in the human body might die on such a diet, and that a malignant mass, though it would certainly not be destroyed, might be so hindered in growth as materially to prolong life and the cachexia produced by it, diminished or prevented. The results gave a loophole of hope.—S. Wyard, L. i./22,840.

Cancrum Oris.—Arsenicals, *e.g.*, Galyl intravenously.

Carbolic Burns. See **Burns.** For poisoning, *vide* p. 16, *et seq.*

Carbuncle. *See* BOILS.

Cardiac Dyspnœa. (*Local use.*)—Carbonic Snow.

Cardiac Mitral Stenosis.—Oxygen inhalation. Decalcification of the blood, *vide* p. 271, *Camphor.*

Cardiac Tonics.—*Acocanthera* (with caution), Adonis Vernalis. Adrenalin, Caffeina, *Camphor*, Convallaria, *e.g.*, Glyco-gelatin Pastil, Digitalis (Tinct., Tinct. Fol. Recent. and Glycetract), *Ibogaine*, Nitroglycerin, Ouabain, Oxysparteinæ Hydrochloridum, *Pituitary* (Posterior lobe), *Saccharum*, Scilla, Sparteinæ Sulphas, Strophanthus (*Strophanthin has been used intravenously*), Strychnina, *Thyroid Extract*, Veratrum Viride.

Drugs acting upon the heart directly:—

The force of contraction may be increased by:—Apocynum, Barium Salts, Convallaria, Digitalis, Erythrophlœum, Physostigmine, Sparteine, Squill, Strophanthus, Suprarenal Preps., Veratrum. *Rate of the Cardiac beat is increased by*:—Atropine, Caffeine, Cocaine, Hyoscyamine. *Both force and the number of beats are increased by*:—Alcohol, Anæsthetics, Chloroform, Ether, Quinine. *The vagus centre is stimulated by*:—Aconite, Alcohol, Apocynum, Atropine, Butyl Chloral, Chloral Hydrate, Chloroform, Cocaine, Convallaria, Digitalis, Ether, Hydrastis, Hydrocyanic Acid, Hyoscyamine (early in the inaction), Nicotine, Picrotoxin, Pituitary Extract (posterior part), Squill Staphisagria (Delphinine), Strophanthus, Strychnine, Suprarenal Extract, Veratrine.—H. W

In acute injuries, such as rupture of the aortic valves in pericarditis, Digitalis is of little value. In chronic diseases of the myocardium, of syphylitic etc., origin, it is of secondary importance, and is often contra-indicated. Of greatest value in chronic valvular disease and in heart fatigue after acute disease or strain.—Sir R. Douglas Powell, Pr. May, '14,612.

In *hypertension* Manganese Butyrate, Insulin.

In *hypotension* Adrenalin in glucose intravenously.

For both hypo- and hypertension, Testicular Ext.—J. E. R. McDonagh.

Effect of Digitalis most striking in cases with rheumatic origin. Digitalis is only called for when the rapid ventricular rate leads to some symptoms on the part of the patient; it is not called for in all cases of weak and rapid cardiac action. The therapeutic benefits of the drug are obtained when the later manifestations of heart disease have appeared and not in the acute inflammatory or actively toxæmic stages.—G. A. Sutherland, L. ii./23,1222.

Auricular Fibrillation.—Digitalis, Quinidine.

Cardiac Depressants.—*Both force and the number of beats are decreased by*:—Acetanilide, Aconite, Antimony, Arsenic, Bromides. Chloral Hydrate,

Emetine, Hydrocyanic Acid, Lobelia, Phenacetin, Phenazone, Pilocarpine, Veratrine.

The vagus may be depressed by:—Large doses of many of the above drugs and drugs which diminish the blood pressure such as Amyl Nitrite and Cocaine.-H.W

Caries.—Calcii Chlorid., Calcii Hypophosph., Calcii Phosph., Saccharated Wheat Phosphates, *Calcium Iodate.*

Caries, Dental.—Calcii Sulphidum (for Pyorrhœa).

Arsenical Paste, Dental Solubes, *Lanolin and Cocaine*, *Lactic Acid Bacilli*, *Paramonochlorphenol.* Lotio Acidi Citrici et Phenolis, *Salol or Formosyl Mouth Wash or Tooth Paste*, Pyorrhœa Vaccine. *See also* Dentistry, local applications.

Examination of teeth showed that the relative proportion of organic and inorganic constituents bears no relationship to the degree in which teeth are attacked by dental caries,—decay is due to predisposing and exciting causes.

Cataract, to prevent Senile.—Iodides, Mercurials, (*Hyd. Cyanid.*), Tonics.—Quinine and Iron, Strychnine.

Cataract treated by bathing the eyes with a lotion of Calcium Chloride 4, Sodium Iodide 4, Water 500. The theory is dehydration of the lens.—Br. Jl. Oph., Apl./20,192; Pres., Feb./21,72.

Catarrh, Bronchial.—*See* **Bronchitis.**

Catarrh, Gastro-intestinal.—*See* **Gastritis.**

Catarrh, Nasal.—Aconite, Ammon. Chlor., Arsenic, Camphor, *Cinnam. Ol*, Cubebs, Elix. Cal. Chlorid. *Glycaphorm*, *Magisal*, *Linctus Pini Terp. et Heroin*, Mist. Anti-catarrhalis, Pilula Atropinæ Quininæ et Arsenici, Quininæ, Tab. Quin. Camph. Morph. et Atrop, *Troch. Camph. Salicyl. Co.*, *Tylcalsin*, *Tyllithin.* *Acid. Carbolic or Acid Tannic Buginarium*, Adrenalin, *Alum Spray*, Argent, Collodial, *Bismuth Co. Pulv.*, Borated Hydrog. Perox., *Camphor inhalation.* *Carbolised Smelling Salts*, Comp. Asthma Fluid, *Dobell's Solution*, *Ethyl Iodide inhaled*, *Eucalypti Oleum*, Eusol, Guttæ Chlorof. Menthol Co., Liq. Alum. Format., *Menthol Inhalation*, *Injection*, *Wool and Snuff*, *Menthol and Camphor Inhalation*, *Ozonic Inhaler*, Peptone Injections, *Potass. Permang. as Nasal douche (very dilute) and some retained with plugs*, *Resorcin as Nebula*, Sod. Desoxycholas, *Sozoiodol*, *Suprarenal Extract*, Thymaglycin, *Ung. Belladonnæ*, *Ung. Morphinæ cum Acid Tannic*, *Combined Cold*, Ozœna, and other *Vaccines*, *e.g.*, of B. Septus, B. Friedlander, Influenza, M. Catarrhalis, Pneumo, M. Paratetragenus, Zinc Ions.

To ward off a cold starting with sore throat, gargle repeatedly with Formosyl Gargle diluted with equal volume of warm water.—W. H. M.

Nothing so efficient as a fine spray of Formalin Solution, ¼ to ½% applied *early*.—Tilley.

In the initial stage of a cold Morphine Sulphate ⅛ grain or Dover Powder 10 grains at bedtime with hot gruel. This usually arrests. If the dry initial stage passed and the nasal fluxion thoroughly established a draught containing Opium, Ipecacuanha, Salicin, Ammonium Acetate and Camphor is useful, or substitute Spirits of Nitrous Ether for the Opium.—Yeo.

Acute nasal sinusitis. Nasal inhalation of mentholised steam for four minutes every hour or two hours. Menthol 10 grains to the ounce of Tinctura Eucalypti or Alcohol (90%) 1 drachm to be added to a jug half full of boiling water. Menthol is not suited to young children. 'Clears the head.' Nose lotions during the acute sinusitis are useless, but when discharge begins freely an alkaline lotion may be sniffed or sprayed into the nose.—Sir St. Clair Thomson, Pr., Jan. 1921.

If patient is in the *shivery stage*, Dover's Powder 10 grains. For the *profuse watery discharge stage*, Tinct. Opii 5 minims every 4 hours. For the *sticky discharge stage*, give alkaline mouth-wash. For a *sore throat*, the following has been described as a sovereign remedy: Tincture of Aconite 2 minims, Potassium Chlorate 5 grains, Solution of Perchloride of Iron 20 minims, Solution of Mercuric Chloride 10 minims, Solution of Strychnine 2 minims, Glycerin 1 drachm, Chloroform Water to 1 ounce. The dose to be used as gargle and then swallowed.—C. and D., June 1921.

Recurrent 'colds in the head.' A daily dose of ½ minim Liquor Atropinæ Sulphatis for 10 days is often of value. Removal to a more congenial air will often work marvels.—F. Stoker, Pr., Nov. 21, p. 348.

Common Cold—its natural cure. If fever develops rest in bed is essential.—O. Heath, L. i./22,688.

Catarrh, Uterine.—*Acid. Carbolic. Glycerin., Boracis Glycerin., Camphorated Carbolic Acid, Iodoform Gossyp. and Pessus, Plumbi Subacet. Glycerin. Opii et Amyli Enema, Ung. Adrenalin,* Ovules (see List) and Tampons, *Zinc. Sulph. Uterine Pencils, and with Alum,* Zinc and other Ions.

Catarrh, Vesical.—See **Cystitis.**

Cathartics.—See **Constipation.**

Caustics.—*Copper Salts, Nitric Acid, Potassa Fusa, Silver Salts, Sodium Ethylate* and Methylate (*vide* Meningitis), *Vienna Paste, Zinc Chloride.*

Cerebro-Spinal Fever.—Antimeningo Serum.—*Antim. Pot. Tart. intra., Hexamine,* Opium, Phenacetin, Phenazonum, Vaccine Treatment. *Calomel and a counter irritant, e.g., Liq. Iodi or Liq. Epispastic over the cervical spine. Flexner's Serum. See* article in Vaccine Chapter.

Iodine in Glycerin as swabbing, Zinc Sulphate as steam spray, Permanganate Spray (1 in 1,000).

Meningococcus Carriers.—*Acriflavine, Di-Chloramine T., Flavine Spray.*

Cerebro-spinal Fever.—Lumleian Lecture.—Sir H. Kolleston L. i./19,411, 593, 645.

Persistence of Carriers.—D. Embleton & G. H. Steven, L i./19,788. Determination of type of meningococcus.—A. S. Gordon Bell, L. i./19,887.

Intraventricular injections of Serum good.—B.M.J.E. i./24,73.

Chancres, Soft.—*Arsenobenzol, Bismuth Benzoate, Hydrarg. Flav. Lotio; Hydrarg. Nig. Lotio, Hydrarg. Subchlor., Hydrog. Perox., Iodic Acid., Iodof. Pulv. and Ung., Liq. Carb. det., Mercurochrome, Pb. Acet. Lotio, Resorcin, Thymol Iodide.*

Chapped Skin.—*Acid. Boric. Ung., Camphor Ball, Ceratum Petrolei, Collodium, Glycerin. cum Aqua Rosæ,* Hazel Foam, *Cucumeris Ung., Lanolin,* Thorii Oleat. Ung., *Ung. Phenoboric, Zinc Cream, Zinc Oleate.*

Chicken Pox, *see* **Varicella.**

Chilblains.—Calcii Chloridum, *Calcii Iodidum, Calc. Lactas. Acid. Boric. Ung., Acid. Camphoric, Acid. Carb. Ung., Aconit. Linim.,* Anserin Mulls Medicated, Balsam Locatelli (even if broken), *Bellad. Lin., and Linim Co.,* Lin. Iodi et Bellad., *Cajuput Ol.,* Calamine Lotion (extra strong), Calcis Chlorinat. Ung., *Capsici. Linim.,* Carron Oil, *Collodium Iodi., Eucalypti Ol. Ung, Glycerini Plumbi Subacet. Ung., Hazel Foam, Hydrogen Peroxide Solution,* Iodine Colloidal, *Iodi Tinct. Decolor., Iodi Ung., Iodoform Wool and Ung. Oleanodyne,* Pasta Ichthyol et Ol. Tereb., *Plumbi. Subacet. Glycerin, Picric Acid Solution,* Tamus Communis, Thorii Oleat. Ung., Paraffin No. 9, *Tinct. Capsici fort.* Vaselinum Zinci Oxidi.

If unbroken the following may do good:—

(1) Immersion of the parts once or twice a day in warm water, with subsequent—(2) Gentle friction with Camphorated Alcohol. (3) Use of a dusting powder,—Bismuth Salicylate 1 in Starch 10. If the sense of burning and pain is not relieved by these means, occlusive dressings with Zinc Ointment or Lassar's Paste, Ichthyolated if required, may be used.

Paramonochlorphenol may be applied as a 2, 5 or 10% solution in glycerin or in alcohol, the weaker solutions being used for the less severe forms. Ointment as follows, equally effective:—Paramonochlorphenol, 1, 2 or 5 parts; Vaseline 50 parts, Lanolin 50 parts.

Calcium Chloride 5 grains and Liq. Calcis Sacch. 1 drachm in milk *t.d.* and Pil. Aloes et Ferri 4 grains once daily. Include eggs in the daily diet.—E. B. Hazleton, B.M.J. i./17,212. Further on Lime Salts, p. 267.

Chilblains *unbroken*—paint with *Tinct. Capsici and Lin. Camph. Co.* equal parts. For *broken—Unguentum Resinæ* ½ *oz., Unguentum Acidi Carbolici* ½ *oz., Zinc Oxide* 2 drachms, Vaseline to 2 ounces.—T. M. Hovell, B.M.J. ii./19,668.

For irritation. Liq. Plumbi Subacet. Fort. 2 dr., Lin. Camph. Ammon. 6 dr., Ol. Sinapis Essent. 2 m. Shake in a bottle. A cream is formed. To be freshly made. Found effectual in our works.

A very strong *Salicylic Collodion* (1 in 8) excellent.—Sir G. A. Reid, Clin. Jl., Dec. 26/23,617.

Chloasma.—*See* **Freckles.**

Chlorosis.—Arsenic, *Arsenic and Iron Injection and Drops,* Iron Salts, Hypophosphites, Manganese Salts, Marrubin, Myrrh et Aloes Pil., Phosphorus, Santonin, Sirop Neurotonique, Sodii Persulphas, *Tritactine,* Vanadates.

Diminish fluids in the body by Caffeine, Magnes. Sulph., Zinc Sulph, *c/.*—p. 262.

Suppress menstruation by hot injections or Amyl Nitrite.—*Vide* Amyl Nit.

Cholera.—Atropine injection, Calc. Permang. (with Hypertonic Saline), Camphora, Carbo Animalis, Charbon Naphtolé, Chloromorphiæ Liq., Copper Salts, *e.g.*, *Sulphocarb.*, Coto and Cotoin, *Erythrol Nit.*, Helba, Hydrarg. cum Creta, Hydrarg. Subchlorid. cum Opio, *Hydrog. Perox.*, Hypod. injections of Quinine Hydrochlorosulphate and Carbamide, *Kaolin*, Magisal, *Mannitol Nit.*, Menthol (for vomiting of), Morphina, *Nitroglycerin*, Ol. Allii Essent., Opium, Paracotoin, Plumbi cum Opio Pil., Resorcin, Salol, Sedeff, *Sulphurous Acid*, Tinctura Capsici or Cayenne in Brandy in emergency. Tinctura Chloroformi Co., Tribromophenol-Bismuth.

Nitrites, the sheet anchor, following on intravenous injection of hypertonic saline to combat the collapse stage.—G. B. Sarkar.

Tannin rectal injection, Saline Solution rectal injection, Cholera Vaccine, *cf.* Multiple Vaccines, Cholera and Typhoid, also *Tetra, Penta* and *Hexavaccines* of Castellani.

Glucose, Subcutaneous and Intravenous Injections.

Value of essential oils (cloves, cinnamon, cajuput, etc.) in cholera—disease invariably aborted.—G. O. F. Sealy, B.M.J. i./22,918.

Cholera prevented and cured by the following:—Ether 30 minims, Oils of Cloves, Cajuput and Juniper of each 5 minims, Acid Sulph. Aromat. 15 minims. —J. W. Tomb, per Jl. Trop. Med., Sept. 1/23,283.

Cholelithiasis.—*See* **Gall Stones.**

Chordee.—Aconite, Belladonna, Bromides, Camphora, Cannabis, Canthar, Tinct. (one minim hourly), Chloral Hydras, Hyoscine, Hyoscyamine, Morphinæ inj. hypod., Opii Suppos.

Chorea.—Acetæa, Adalin, Antimonial preps., Arsenic, all Bromides, Aspirin, Aspriodine, Brometone, Brominol, Cacodylates, Cannabis and Chloral, Calcii Chlorid., *Calcii Phosph.*, Camphor Monobrom., *Chloral Hydras*, Cimicifuga Ext. Liq., Codeine, Conium and Coninæ Hydrobrom., Ferri Bromid., Ergot, Ferri Phosph., *Formates. Hyd. Perchlor.*, Gelsemium preps., Iodides, *Iodoprotein*, Magisal, Mag. Sulph., Morrhuæ Ol., *Nitroglycerin Tabellæ*. Phosphorus, Physostigma and Physostigmine, Salicylic Acid, Sedasprin, Sodium Salicylate, Strychnine, Sirop Neurotonique, Sulphonal, *Tylcalsin, Tyllithin*, Valerianates, Zinci Bromid., Sulphas and Oxidum.

Cicatricial Tissue.—Cicatricine, Iodolysin, Injection Thiosinamin et Sod. Salicyl., Ung. Thiosinamin, et c. Phenazon.

Cirrhosis of Liver.—Ammon. Chlorid., Iodides, Acid Nitro-hydrochloric, Calcii Chlorid., Calcii Lactat., Sodium Phosphate.

Senecio Disease.—Cirrhosis caused by seed of *S. ilicifolius*, etc., in grain in S. Africa.—L. ii./20,848. See also A. R. Cushny, *ibid.* 1089.

Cold, Common.—See **Catarrh, Nasal.**

Colic, Hepatic and **Renal.**—Opium, Morphine, Belladonna (in large doses), Papaverine (Biliary), Amyl Nitrite, Chloroform, or Ether Inhalation.

Colic, Intestinal.—Æther, Benzyl Benzoate, Calcis Aqua (for infants), Cajaput Ol., Camphora, *Cannabis*, Chloroform, Chloromorphiæ Liq., Elixir Gentianæ Acidum, Menth. Pip. Ol., Morphine preps., Opium preps., Tinctura Carminativa, Bromides, Chloral, Hyoscyamus, Peppermint, Ruta. Valerian.

Colitis.—Aperfine, Bismuth Salicylate, Hydrastis, Ispagula, Ixora, Kaolin, Methylene Blue, Naphthalene, Naphthalene Tetrachloride, Psyllium, Salicylates, Salol, Thymaglycin, Trilactine, Vaccinum Myrtillus, *B. Coli* and other Vaccines.

Saline and Boric Enemata, Copper Sulphate injection, *Oils*, Thymaglycin.

Glucose, Subcutaneous and Intravenous Injection. Zinc and other Ionisation.

Basuto negroes in Orange Free State do not suffer from.—B.M.J. i./23,1116.

Colitis, Mucous.—*Bismuth Sod Salicyl-Salol Pil.*, Enema Bism. et Sod. Salicyl., Emulsio Paraff. c. Bismuth et c. Pancreatin. Astringents, such as Tannic Acid preparations and Nitrate of Silver, and sedatives, *e.g.*, Bismuth Salts and Petroleum Emulsion, have been widely used. Salol, *B*-naphthol and intestinal antiseptics generally. Colon Lavage, Kaolin, Vaccinium Myrtillus.

Saline Transfusion or Sea Water.

Charcoal, 2 drachm doses 4 times a day after meals. Motions in a fortnight rendered free from mucus and blood. Used in India to ward off dysentery and diarrhœa.—T. B. Broadway, L. i./18,637.

An essential indication is to secure the emptying and cleanness of the colo This may be done by intestinal lavage. Bismuth in bulk (2 ounces) given bread and milk or jelly taken every week or ten days is often of benefit. seems to act by scouring the colon. Where there is much fermentation ounce of Wood Charcoal may be mixed with the Bismuth. For clearing t bowel Castor Oil is best.—Lord Dawson of Penn, B.M.J. ii./21,34.

Colitis, Ulcerative.—*Anti-dysenteric Serum*, Bismuth Carb., *Calc. Su phid. Stearettes*, *Ipecac*, *Methylene Blue*, Potass. Permang., *Silver also Copp and Zinc ionised.* Vaccines.

Enema Bismuth. Subgallat., Ol. Morrh. c. Cresot., Emulsio Sulphuris injecte through an artificial anus.

Collapse and Fainting.—Adrenalin, intracardiac injection of, Æther in hypod., Æther Spt., and Spt. Co., Alcohol, Ammon. Arom. Spt., Ammo Vapor, Amyl Nitris., *Camphor Inject.*, Capsules Aromat., Ammonia, *Cursc mann's Solution*, Digitalis Tinct. and Inj. Hypod., 20 m., *Erythrol Nit. Tabs* Mannitol Nit. Tabs., Nitroglycerin Tabs., Oxygen, Oxygen and Alcoho *Regenerative Tablets.* For Rectal Feeding see p. 414.

Comedones.—Glycerinum Kaolin Aceticum, Iodates, *Phenol, Calamin Lotion*, *Calx Sulphurata*, *Fowler's Solution*, *Resorcin*, Vaccine Staphylo. Se also Acne.

Conjunctivitis. (Locally).—Acid. Boric, Acriflavine, Alumen, Alum Aceto Tart., Argenti Acetas, Argenti Fluoridum, Argent. Iodid. Recent, Argen Nitras, Argenti Oleas, Argyrol, Belladonna, Bismuth Oxyiodogallas (gonor hœal), Boroglyceride, Borax, Colloidal Silver and Mercury. Collyrium Adstrin gens, Luteum, Cuprung. Hydrarg. cum. Morphina Oleat, Hydrarg. Oxid. Flav Ung., Hydrogen Peroxide, Hydroquinone, Opii Vinum, Resorcin, Zinc. Aceta vel Sulph. Lotio, Zinc Ions.

Sodium Bicarbonate in warm 3% solution is the most generally serviceabl cleansing solution in treatment of blepharitis.—R. A. Greeves, L. ii./23,997

Bacteriology of conjunctivitis.—L. ii. 11,1418.

Conjunctivitis, Diphtheritic (*Local use*).—*Formaldehyde*, Hydrog Perox., *Hydroquinone*, *Iodol*, *Quininæ HCl. vel Sulph. Lotio.*, *Resorcin*, Methy lene Blue.

Corrosive Sublimate 1 in 8,000 used in treatment of conjunctivitis—eye washed every 2 hours. Lids painted daily with Silver Nitrate 2%.—N Cantlie, Jl. Trop. Med., Feb. 1/23,45.

Constipation.

(1.). ***Laxatives:***—*Agar*, Aloes, Aloin, *Aperfine*, Calomel, Cascar (Capsules, Elixir, Jelly, Mistura Laxativa, Pastils), Castor Oil (useful wit Glycerin *p. æq.*), Emulsio Paraff. c. Rhamno Frang., *Maricol* or other Casto Oil Powder, Emblic Myrobalans, Elixir and Syrupus Ficorum, *Flax Seed* Guaiacum and Sulphur Tablets, *'Hindu Dates,'* Hormonal, Levurine *Maltaffin*, *Maltolivine*, Manna, Mist. Cascara Co., *Mucogene*, Ol. Olivæ, *Oleum 'Elliott' Capsules*, Ol. Ricini Aromat, *Paraffagar*, Paraffinum Liq. and Molle, Pavimol, Eff. and Tablets Phenolphthalein and *Phenolphthalein Co.*, Pil. Cascara Co., Pulv. Glycyrrhizæ Co., Rhamnus Frangula, Rhubarb preps of, Senna (Elixir, Conf.), *Sodii Hyposulphis*, Sulphuris Conf., Tamar Indien Tinctura Laxativa, Trilactine Tabs., or Milk.

Tab. Phenolphthalein with Hyd.c. Creta *aa.* 2 gr. is a useful combination.

(2) (*a*) ***Secretion Stimulants***—Ammonium Chloride, Aqua Aperiens, Jalap and preps., Magnesium Chloride and Citrate, *Marienbad Salt Tablets Normal Saline* (1 pint) *mane sum.* Saline Aperient Waters, Seidlitz Pdrs, *Sodii Chlorid.*, Sodio-Magnes. Sulph. Eff., Sodii Phosph. Eff., Sodii Sulph. Eff. (*b*) ***Hepatic Stimulants***—Aloes, Colocynth and preps., Ipecacuanha, Iridin, Jalap, Mist. Hepatica, Podophyllin, Rhubarb, Sodii Glycocholas, Sodii Sulph., Taraxacum Cocoa, *Elixir Gentianæ Acidum.* (*c*) ***Cholagogues***—Blue Pill, Calomel, Fel Bovinum, Euonymin (action thought to be simply by relieving the intestine), Grey Powder, Leptandra, Magnesium Chloride, Pilulæ Laxantes, Scammony (Pil. Conf.), Stillingia, Taraxacum preps.

It is stated the only two known bile stimulants are bile itself and Sodium Salicylate.

(3.) ***Peristalsis, Excitants of***—Ignatia, Nux Vomica, Senna, Strychnine, *Pil. Bellad. Nucis Vom. et Cannabis.*

(4.) ***Spasm Relievers.***—Asafœtida, Belladonna, Bromides, Chloral, Hyoscyamus preps., Peppermint, Valerian.

(5.) ***Nerve Tonics***—Arsenical preps., Caffeine, Sodii Glycerophosphas, Zinc Valerianas.

Pil. Hydrarg. Subch. Rhei, Cascar, et Capsicin would have combined effect.

Constipation may exist with a daily opening of the bowels. Delay in passage of the intestinal contents over the normal 40 hours can easily be shown by giving charcoal biscuits to colour the fæces.

Pituitary Extract has been used to counteract intestinal toxæmia.

Enemata (*vide* p. 415), and *Trilactine, Injection and Suppositories. Fel Bovinum, Gauze Tampons coated with Soap are used.*

Hypodermic Purgatives.—Aloin, Apocodeine, Colocynthin, Hormonal Physostigmine.

Intestinal Paresis.—*Enema Ammoniæ.*

A correspondent in the C. and D., Oct. 6th, 1922, draws attention to the enormous quantities of laxatives, Syrup of Figs, Liquid Paraffin, Laxative Tablets, etc., sold at present to mothers of babies fed on dried milk. He adds "considering the numerous complaints which are likely to trace their origin to constipation, it seems pitiful that children should have to be dosed in this way at such an early age. When the children grow up they are likely to have constant trouble with corresponding ill-health, and some information and guidance in the matter would be an advantage."

Convulsions.—Amyl Nitris, Anæsthetics, Bromalin, Camphor Monobrom., Chloral, *Chloral and Morphine combined,* Chloroform, Conium, Morphine preps., Moschus, Podophyllin, Potass. Acetas, Potassii Bromid., Rue, enema of—(or infantile), Urea-Bromine, Santonin, Sodii Bromid., Sodii Nitris, *Syr. Pilocarpin et Potass. Brom.*

Chloral and Morphine combined.—Chloral Suppositories.

Types of convulsive seizures in very young infants. Amongst others 'idiopathic convulsions' are dealt with. Chloral is successful, 1 grain every 2 hours to begin with.—J. Thomson, B.M.J. ii./21,679.

Convulsions, Puerperal.—*See* **Eclampsia.**

Cornea, Inflammation, and Ulcers of. (*Local use.*)—Argent. Iodid. Rec. *Atropine, Belladonna, Boric Acid Lotion, Cocain. Hydroch. Liquor, Daturine, Duboisine, Eserine, Fluorescein* (*diagnostic*), Iodine Tincture (Cocaine before and after painted on), Scarlet Red, *Hydrarg. Oxid. Flav. Ung., Hydrarg. Subchlorid., Infusum Abri, Pilocarpine and Quinine Lotion.*

Dionine 5% useful, see p. 558. Hyd. Oxycy. Injections, see p. 466. Phenol Camph. applied with match, see p. 18. Mag. Sulph. up to saturated solution, see p. 541.

Corns (*Local use.*)—*Acetic Acid* (*glacial*), *Carbolic Acid, Collodium Callosum, Cupri Oleas, Fowler's Solution of Arsenic, Papaw, Formalin, Lin. Iodi., Ung. Iodi Intinctum, Iodum Oleatum,* Salicylic Ions, Thorii Oleat. Ung.

Corns, Soft (*Local use.*)—Durine, Perfumed Formosyls, *Silver Nitrate Solution 1 in 3 applied every 4 or 5 days.*

Coryza.—*See* **Catarrh, Nasal,** and **Hay Fever.**

Cough.—Acid Hydrobromic, Acid. Hydrocyanic, Belladonna, *Camphor and Creozote inhaled,* Camph. Co. Tinct., Chloral Hydras, Codeina, Conium, *Cynoglossum,* Elixir Pectorale, *Elix. Pini Terpin et Diacetyl-Morph. Gee's Linctus,* Gelsemium, Glycaphorm, Glykeron, Guttæ Rosæ, Hyoscyamus, *Lichenoids,* Linctus Camphor. Comp., *Linctus Expectorans* (Antimonii), *Linct. Menthol, Linct. Morph. Comp., Linct. Morph. Hydrocyanicus,* Pavimol, Linctus Terp. Heroin Co., *Linct. Thymi et Diaphorm.,* Pastilli Pectorales, Ozonic Inhalers, *Liq. Pectoralis,* Marrubium, *Mist. Apomorph. Co., Mist. Tussi Rub,* Morphinæ Linctus, Morphinæ Troch., Morphinæ et Ipecac. Troch., Opium preps., Pastilli varii. *q.v.,* Picis Liq. Pil., Prunus Virginiana, Rami Syrup, Sandal Wood Oil, Spirit of Chloroform, Syrup Coccillanæ Comp., Syrup. Pini Pumilionis, Syr. Thymi c. Diaphorm, Symphytum Infusion, Tab. Formalin to suck, Tabellæ Glycyrrhizæ, Terpin Hydrate, Terebenum, Terpinol, Troch. Tussis, *Tinct. Benzoin Co., Tylcalsin, Tyllithin,* Vapor Creosot. Co. (Phthisical cough). *Codeine Periodid.*

Cretinism.—Thyroid Preparations (preferably *standardised* Liquor or Tablets). *'Three Gland' and 'Four Gland' Elixir and Tablets. Suprarenal gland.*

Cystitis.—*Acid Camphoricum,* Acid Lactic, Aconite. Alkalis. Ammonium Benzoate, Betol, Belladonna, Benzoates, Boric Acid, Buchu, Collinsonia Canadensis, Copaiba, Cystazol, Eucalyptus Globulus, Gokhru, Hexamethylenetetramine and comps., Hydrastis, Juniper, Kava Kava, Liquor Potassæ,

Magnesii Boro-Citras, Mercurochrome, Pareira, Pichi, Salol. Sod. Salicyl, *Sorghum*, Triticum repens, Uva Ursi, Vesalvine 'B' and Vesalvine 'S' *B. Coli* or appropriate Vaccine.

Argenti Fluoridum, Iodidum and Nitras, B. Ac. Lactic. Irrigation, *Cocaine Lactate*, Colloidal Mercury and Silver, *Creolin Solution*, Iodine Douche, *Formosyl*, Quinine Bisulphate 1 in 2,000, Salicylic Ions, Zinc Sulphanilas.

Cystitis—its Causes and Treatment:—Internal medication in cases of *mild B. Coli infections* in cases of incontinuence or involuntary nocturnal micturition in children and the cystitis commonly occurring during and after pregnancy usually successful if taken in hand early. Drinks containing Acetate and Citrate of Potash: Conf. Senna and Conf Sulphuris *p. æq.* Phenacetin and Ext. Hyoscyamus in 5 grain doses, and if pain very acute and vesical tenesmus present a rectal injection of 2 drachms of Starch containing Antipyrin and Laudanum may be given. Urinary antiseptics as the inflammation declines.

Locally.—Boric Acid Solution ¼ strength most useful if thoroughly done. In chronic cases Silver Nitrate 1 to 2 grains per ounce carefully instilled (in a child 3 ounces may be used and left in the bladder). When the vesical end of the mucous membrane of the canal becomes involved the passage to be swabbed out with Liq. Phenol through a speculum and immediately washed with Sodium Bicarbonate Solution to check action of the Phenol.

Acute Cystitis.—Phenacetin and Ext. Hyoscyami 5 grains each *t.d.*. Appropriate Vaccine. Local Treatment.—Instillations, irrigations with Permanganate 1 in 2,000, Protargol, etc.

Chronic Cystitis.—Internally Boric Acid, ditto with Sodium Benzoate, Antiseptic irrigation. Full directions are given for the latter by syphoning.—L. i./12,570.

Innumerable failures are recorded with Urotropine. *Vide* abst., p. 186.

Cystitis, chronic.—Ammonium Benzoate, Buchu, *Cinnamates*, Eusol as douche, Grindelia, *Hydrog. Perox.* (5 *to* 10 *vol.*), Juniper, Mercurochrome Pareira, Quinine Sulph. Acid douche, Salol, Sandal Wood, *Santalol* (Caps. and Tabs.). See also above.

Croup, False.— *See* **Laryngismus Stridulus.**

Dandruff, *see* **Seborrhœa.**

Deafness.—Pilocarpine, Uranium, *e.g.*. Autunite Irradiation, *q.v.* See *also* **Earache.**

In old people Thyroid Siccum ½ gr. twice daily.

Debility.—Acidin, Alcohol, *Aperfine*, Arsenic preps., Bismuth and Pancreatin, Bone Marrow Extract, Bovril, Calcii Hypophosph. Syrup, Calcii Phosph., *Clac. Glyceroph. c. Lacte Exsicc.*, Capsulæ Cruoris, *Capsulæ Valerianat.*, *Catha Milk and Glycerophosphates*, *Chondrin*, Cinchona preparations, Conf. Glyceroph. Co., Elixir Ferro-Manganes. Pept., Elixir Gentianæ Acidum, *Elix. Hæmoglobin c. Lecithin, Emuls. Ol. Morrh. c. Lecithin*, Eupatorium, Ferrocarnis, *Formates* (*Inorganic and Quinine*), Glycerophosphates, *Glycerole of Hypophosphites*, Hæmoglobin Capsules and other preps., Herogen, Hypophosphites, Iron Salts, Kreochyle, Kolentos, Lecithin Pulvis, *Liq. Pepsinæ et Caffeinæ*, Maltum, *Malted Glycerophosphates*, Maltolivin, Marrubin, *Malt Ext. c. Hæmoglobin, c. Pancreatin, c. Hypophosph., &c.*, Malt Ext. cum Syr. Ferri Phosph., Morrhuæ Ol., *Oleum 'Elliott' caps*, *Pavimol*, *Phosphorus*, *Pil. Potentin Co.*, Pil. Lecithin c. Ferri Iodid., *Pulv. Glycerophosph. Co.*, Quassia, Quinine preps., *Sirop Neurotonique*, Sodium Cacodylate, Strychnine salts, *e.g.*, *Cacodylate and Formate*, Syrup Ferri Phosphat. cum Quinina et Strychnina, *Syr. Formatum Comp.*, *Syr. Kolæ Comp.*, *Syrupus Glycerophosphatum cum Formatibus*, *Helba*, *Tylmarin*, Trilactine. *See also* **Anæmia.**

Delirium Tremens and *see* **Alcoholism.**—Ammon. Carb., Apomorphina, Bromides, Camphora Monobromata, Capsicum, Chloral, Colloidal Gold, Digitalis, Elix. Quinidine, Hyoscine, Hyoscyamine, Opium preps., Phosphorus, Quinine preps., Sodium Chloride Injections, Strychnine, Sulphonal, Urea-Bromine, Valerianates.

Sod. Brom. Intrathecal injection.

Paraldehyde is a safe hypnotic.

Hyoscine, Sulphonal and Veronal in delirium tremens. Notes on each.—R. Eager, B.M.J. i./20,114.

Dengue Fever.—Sodium Salicylate, Salicin, Potassium Iodide, Phenacetin and Caffeine.

Dengue and malaria. Dengue only occurs where malaria is endemic—a

modified form of. Ten cases cited in which attack of dengue apparently gave immunity to malaria. Suggested that dengue antitoxin should be employed as prophylactic against malaria.—R. E. I. Johnson, Jl. Trop. Med., Jan. 15, 23,27-28; May 1/22,111,112.

Dentistry. (*Local use*).—*Adreucaine, Alcohol Sandarachi, Borated Hydrogen Peroxide, Butyn, Cinnamon Paste, Cocaine Lanolin, Cocaine-Menthol-Phenol, Codrenine, Collutorium Alkalinum Astringens, Formalin, and with Creolin, Copal Solution, Dental Anæsthetic, Dental Compo, Dental Rubber, Dental Wax, Emplastrum Capsici, Eucaine Lactate, Erythrophleine, Gossypium Arseniosum, Hydrogen Peroxide, Iodoform Paste, Formosyl Mouth Wash, Tooth Paste, and Dental Dressing, Mercury Amalgam, Pasta Arsenicalis, Zinc Oxychloride, Zinc Oxyphosphate, Zinc Oxysulphate.*

For use after anæsthetics.—Amyl Nitrite. *Vide* also Chloroform, &c.

Derbyshire Neck.—*See* **Goitre.**

Dercum's Disease.—Thyroid (*q.v.*)

Dermatitis.—(*Locally*) Liq. Alum. Acet., Acid Boric Lotion, Anserine Mulls Medicated, Paraffin No. 7, Perfumed Formosyls, Ung. Ac. Salicyl 50%, Ung. Rusci Co., Carbolised Zinc Ointment.

Industrial dermatitis—bakers' itch, sugar itch, water rashes, Formalin dermatitis, from cutting oils, in engineering factories, Tar, etc.—Hall Stewart, B.M.J. i./22,498.

Dermatitis exfoliativa neonatorum, pemphigus neonatorum (Ritter's Disease). A case fatal.—R. McDonald Cairns, B.M.J. i./23,186.

Dermatitis venenata. More than 40 species of plants in the Antilles produce skin reactions, either by the latex of the plants or by their appendages, generally the hairs—due in some cases to the existence of an irritating acid oil. —C. Pardo-Bastello, per Jl. Trop. Med., June 1/23,202.

Arsenical dermatitis—Contramine, Intramine.

Strong soaps and permanent hair-waving bad.—R. Labouraud, L.i./,23,1318.

Dermatitis 'X Ray' (*Local use.*) Boric Acid Ointment, Radium, Mesothorium Bromide. See also Eczema, Psoriasis, etc.

Keratosis accompanying.—Carbonic Snow.

Diabetes Insipidus.—Arsenic, Adrenalin, Belladonna, Ergot, Gallic Acid, Lithium Salts, Lithion, Opium, *Pituitary Injection.*

Diabetes Mellitus.—Determine the type of Glycosuria by blood test. Acid Lactic, Alkalis, Arsenic Brom., Aspirin, Arsenobenzol Suppos. and Novarsenobenzol intravenously, Cacodylates, *Calcii Iodid.*, Codeina, Codeinæ Pill Co., *Cremor Magnesiæ*, Creosotum, *Fœxin Ext.*, *Duodenal Extract*, Eucalypt. Fol. Inf., *Gluten*, Gold Salts, *Glycerin*, Glycerophosphates, *Guaiaci Resina*, Hexamethylenetetramine, Hydrogen Peroxide, Insulin, Iron Salts, Jaborandi, Lævulose, *Lecithin Elixir and Emulsion*, Levurine, Magnes. Peroxide, *Milk and Glycerophosph.*, Morphina, Nuclein, Opium, Oxygen, Ozonic Ether, Pancreatin, Phosphorus, *Pil. Codein. Valerian Co.*, Potassium Chlorate, Saccharin , Elixir and Tabellæ of, Salol, *Santonin*, *Sedeff*, Sodii Arsenias, Sodium Chloride intravenously, Sodii Citras, Sod. Lactas, Sodii Phosphas, Sodii Salicylas, Suprarenal gland, *Taka-Diastase*, Thymol, Thymus and Thyroid gland, *Trilactine*, *Trypsin*, Vinca major, Yeast.

Diabetic Foods, see p. 588. Dietetic Treatment, see acidosis, Vol. II.

Glucose per rectum especially where acidosis threatens. Pituitary Extract. *Lactose* (*q.v.*) is stated to be assimilated by diabetics.

Allen's Dietetic Treatment. A paper dealing with the metabolic changes produced by the treatment.—P. J. Cammidge, B.M.J. i./17,503. See also O. Leyton, B.M.J. i./17,252; and Modern Views discussed.—E. P. Poulton, L. i./18,863,895; ii./18,31. *See also* H. J. Starling, Clin. Jl., Aug. 23,365.

The treatment consists of regulated fasting and gradual dieting—metabolic processes are given chance of recovery. In dieting it is now understood the proteins and fats might be deleterious as well as the carbohydrates.—Sir A. Garrod, B.M.J. ii./21,706.

Of 143 cases treated by fasting 52 died. The method may give rise to dangerous symptoms. Clinical diabetes is probably not a single simple pathological entity but a symptom-complex which may develop along at least three lines, of which disturbance of the pancreas is one.—P. J. Cammidge, B.M.J. ii./21,708.

A lecture on Diabetes at N.E. London Post Graduate College. Appears to

be increasing in prevalence. In 1919 the deaths considerably exceeded those from such common diseases as appendicitis, enteric and cirrhosis of the liver. *Race.*—It is said to be commoner among the Hebrew race. The milder form is certainly commoner but not the severe type. Drugs not needed except when there is a marked tendency to acidosis in which Sodium Lactate and Citrate may be given in 40 grain doses of each, thrice daily.—Sir W. Willcox, Pr., Nov. 1921, p. 305.

Ætiology of, and Treatment.—P. J. Cammidge, Pr., June 22/396.

Antipyrine best used with Hexamine.–Maurice Loeper, per Pr., Sept. '23, 235.

Negligible glycosuria.—O. Leyton, Pr., Jan. 1922, p. 113.

Glycosuria of malarial origin. A case with 0·85% Glucose cleared up on treatment with Quinine. Another case starting with 2% Glucose was evidently chronic malaria though parasites were not found. Strict diet. Finally under intensive Quinine treatment with ordinary diet the sugar disappeared.—A. Castellani and J. Graham Willmore, B.M.J. ii./21,286. See also G. A. Harrison, *ibid.* 630.

A diet of 900 calories, mostly fat, produces the same fall in B.M.R. as fasting—less dangerous and more successful in desugarization.—L. H. Newburgh and P. L. Marsh, per Jl. Trop. Med., June 15/23,224.

Casein and Cream every 2 hours in small quantities in diabetes with satisfactory results. The results are often very prompt.—R. T. Williamson, B.M.J. i./15,456. Importance of regulating the fat-intake.—P. J. Cammidge, B.M.J i./18,393.

Amino-Acids Content, Significance of *Vide* Amino Acids, Vol. II.

Coma of:— *See* ***Insulin.***

Diabetic coma in patients under Insulin.—W. T. Collier, L. ii./24, 575.

Alkaline drinks freely as routine treatment, also Sodium Carbonate (not Bicarbonate) 40 Gm. per litre intravenously if coma sets in.—Prevention and treatment of.—P. J. Cammidge, L. i./19,60.

Purging treatment by natural aperient water, followed by drinking water or thin drinks—said to restore to health and remove all symptoms.—L. i./09,202.

Air-hunger or acidosis may arise when diabetic patients either take an excess of Carbohydrates or, on the other hand, when the Carbohydrate is too suddenly removed from the dietary. In diabetes where 'air-hunger' develops examine chest for evidence of tubercle or other pulmonary trouble—this may be present even when, or particularly when, sugar shows signs of decreasing. In marked apathy or drowsiness in either diabetic or non-diabetic patients being fed per rectum, it is a safe rule to give Alkalis and Carbohydrates if Acetone and Diacetic Acid be found in the urine.—N. Tirard. Clin. Jl., Apl 5,/'11,401.

Exceedingly large doses, *e.g.*, 500 Gm. of 5% Sodium Bicarbonate intravenously are given, also Sodium Bicarbonate 40 Gm., Levulose 30 Gm. in water, 1,000 Cc. by drop enema.

Langdon Brown's Mixture for control of acidosis: Sodium Bicarbonate 1 drachm, Potassium Citrate 30 grains, Calcium Lactate 5 grains, Magnesium Carbonate 5 grains, Chloroform Water to 1 ounce.

For the **thirst of**:—Pastillus Acidi Citrici c. Limone.

Diaphoretics.—

Acting peripherally:—Nicotine, Pilocarpine. *Warmth* (local application) and Alcohol (internally) perhaps act in the same way in addition to their vascular action. *Acting centrally*:—Ammonium Acetate, Ammonium Citrate, Antimony Salts, Ipecacuanha, Opium. *Mode of Action doubtful*:—Potassium Acetate, Potassium Citrate,—*and feeble*:—Aconite, Colchicum, Lobelia and Salicin. *Anhidrotics* or *Antihidrotics*,—Acting peripherally,—Atropine by acting on the ends of the nerves in the glands, Agaricin, Hyoscyamine, Stramonium. Cold (local application). Mode of action doubtful.—Acids, Nux Vomica, Picrotoxin, Quinine, Zinc Salts.—H. W.

Diarrhœa.—Acid. Camphoric., Acid. Carbolic., Acid. Gallic, Acid. Hydrochloric Dil., Acid. Lactic., Acid. Sulph. Dil. and Aromat., Agaricus albus and Agaricin, *Albumen Water*, *Allmatein*, Anthemidis Tinct., Benzonaphthol, *Benzyl Benzoate*, *Biscimiod*, Bismuthi et Cerii Salicylas, Bismuthi Salicylas, Tannas and other preps., Cajuput Oil, Calcii Carb., Calcii Salicylas, Calcii Aqua, Camphora, Catechu, *Catha Milk and Glyceroph.*, Cinnamon, Cloves, *Conradi's Drops*, Coto, Cotoin, Cretæ Arom. Pulv., and cum Opio, Cupri Sulph., Cupri Sulphocarbol., *Cyllin Syrup*, Eucalyptus Gum, *Liq. Ferri Pernitratis*, Ferri Salicylas, Fortoin, Guaiacol Carb., Hæmotoxylin, Hydrarg.

Perchlor. in small doses, *Hyd. Subchlor.* (large doses, *q.v.*), Ipecacuanha, Ixora, Kaolin, Mist. Antiseptica, U.C.H., for infants (Mistura Diarrhœa, Board of Health), Naphthalin, Naphthol, Opium preps., Plumbi Acet., Pulv. Ipecac. Co., Pulv. Kino Co., Quercus, Quininæ Salicylas, Resorcin, *Roseberry's Mixture*, Ricini Ol. *and Aromaticum*, *Sedeff*, Salacetol, Salicylic Milk, Sassafras, Sodii Phosphas, Sod. Salicyl., Syr. Ægle Marm. Co., *Thieleman's Mixture*, Tribromophenol-Bismuth, Sodii Sulphas, Trilactine Tablets or Milk, *Tylcalsin*, *Tyllithin*, *Vin. Coto-Pepsin*, Whey Powder, Zinc Sulpho-carbolate.

Acid. Tannic. Suppos., et cum Opio, Amyli Enema, et cum Opio, Gallæ Suppos. et cum Opio, Tannin rectal injection, Turpentine Stupes. See also Dysentery p. 1026.

Diarrhœa, Infantile.

Saline injections given either by the skin or bowel are of great and saving value in acute summer diarrhœa in children.—W. J. Tyson, Clin. Jl., Aug. 29/23,417.

Calomel in large doses has been advised.

Diarrhœa of Phthisis.—Coto and drugs as for diarrhœa, *q.v.* Kaolin.

Diphtheria.—Acid. Salicylic., Aconite, Antitoxin, Calcii Sulphid., *Endotoxin*, Ferri Perchlorid., *Hydrogen Peroxide*, Kaolin, 'Petroleum Oil' (Kerosene), Sodii Benzoas, Sodii Chloras, Sodii Hyposulphis, Strychnine preps. for paralysis when a sequela, Toxin-Antitoxin Mixture as prophylactic, Tribromophenol. Normal Saline (in grave toxæmic states).

Acid. Benzoic. Nebula, Acid. Carbolic. Glycerin. and Nebula, Acid. Lactic. Nebula, Acid. Sulphuros. Nebula, Argent. Nit. Swab (*v. infra.*), *Chlori Gargarisma*, Colloidal Silver, Mercury, Copper Ionisation (chronic diphtheria of the ear), *Formalin Spray*, *Hydrogen Peroxide*, *Hydroquinone*, *Iodic Acid*, Iodised Phenol (Pigment, Gargle and Inhalation), *Iodol Pigment*, *Loeffler's Pigment*, *Menthol Pigment*, *Naphthol cum Camphora*, Nebula Acid Malic, *Ozonic Ether*, *Papayotin*, *Pyocyanase*, *Resorcin*, *Sodii Benzoatis Nebula*, *Sodii Chlorinat. Liquor*, *Toluol.*

Spraying the throat with Hydrarg Perchlor. Solution 1 in 1000 is of extraordinary and life saving value.—L.i./11,494

For sustaining blood pressure in diphtheria Adrenalin in small doses at regular intervals (5 to 10 minims every four hours by mouth, or 2 to 3 minims hypodermically every 6 to 8 hours), from the beginning of the case is useful. It is, however, a grave error to give Adrenalin or any like substance towards the end of the case or in large doses irregularly.—J. J. Jervis and V. C. Martyn Pr. Aug. '14,277. *See also* **Adrenalin.**

Aspirin, Phenacetin and Dover's Powder. Combined Tablets are made.

Sterilisation of the throat after diphtheria by painting with 12½% Silver Nitrate solution. A second application (25%) may be needed. Of 40 cases 28 were sterilised by one application; 8 cases required two paintings.—W. S. Thacker's Method (B.M.J. i./16,374.).—M. E. Harding, B.M.J. i./18,15.

A serum has been made (Arloing, Lyons) by injecting into the horse the diphtheria toxin and the bacilli together. Tablets for *internal use* or an *insufflation* of this *dried serum* mixed with tragacanth and an inert powder are effective.—K. L. bacilli found to disappear from the throat.—Pr. Feb. 1920.

Diphtheritic Infections of the Skin.—Zinc Ions.

Dipsomania.—*See* **Alcoholism.**

Disinfectants.—See Chapter on.

Diuretics.—*See* **Dropsy Renal.** *See also* Ammon. Acet., Cantharides, Digitalis, Pill. Hydrarg., Theobrom. Sod. Sal.

Dropsy, Cardiac.—Acocanthera (with caution), Adonidin. *Apocynum-preps.*, Asparagin, *Baillie's Pill*, Convallaria, Digitalis, Elaterium. Erythrophlœum, Pituitary (Entire gland), Strophanthus, Theobromine Aceto-Salicyl Theophylline. Pil. Hydrarg. (avoid if renal disease present).

Sodium Chloride-free diet.

Dropsy, Hepatic.—Ammon. Benzoas, Ammon. Chlorid. Hydrarg. Sub. chlorid., Ol. Juniperi, Sodii Bicarb., Sparteinæ Sulphas.

Dropsy, Renal.—Ammon. Acet., Cit., Tart., Apocynum, Buchu, Caffeina, Cantharides Tinct., Elaterium, Erodium Cicutarium, Hydrarg Pil,, Iodo-Caffeine, Iodo-Theobromine, Jalapa, Pilocarpine, Pineal Body Extract (?), Potass. Acet., Potass. Tart. Acida, Potass. Iodid., Potass. Nit., Scilla, Scoparius, Sodii Iodid., Theobromine-Aceto-Salicyl and Sodium Format. and Salicyl, Theophylline, Urea-Bromine, Vinum Diureticum.

Pot. Permang. Injection.—*See* Uræmia.

Dupuytren's Contraction.—Chlorine ions from Sodium Chloride, Fibrolysin, Injectio Thiosinamin et Antipyrin (see also Sir J. Barr, under Calcii Chlorid). Thyroid Gland and Three and Four Gland Tablets.

5% Salicylic Acid Ointment found effectual in several weeks. Recent works call Dupuytren's contraction a fibrositis.—D. A. Alexander, B.M.J. i./23,794.

Dysentery.—Determine cause.

Alum, *Antidysenteric Sera*, Argenti Nitras (Rectal Injection), Belæ Fructus, *Benzyl Benzoate*, Bismuthi et Cerii Salicylas, *Bisciniod*, *Bismuth Tart. Solubile*, *Calcii Salicylas*, Calotropis, Cannabis, Cassia Beareana, Calomel, &c. (the evacuant method), *Chaparro Amargosa* (Bitter Bush) for 'carriers,' *Crocq's Pill*, Cupri Sulphocarb., *Cynoglussum*, *Cyper. Caps.*, or *Mist.*, *Dec. Simaruba et Punic. Granat*, *Elix. Agrimon Co.*, Emetine Bismuth Iodide. Emetine Injections, *Emetine Periodide*, Eucalypti Gum, Fæxin, Guarana, Hæmatoxylon, Hamamelis, Helba, Hydrarg. Perchlorid., Hyd. Subchlor. (large doses), *Hydrog. Perox.*, well diluted as enema, *Hysterionica*, *Ipecacuanha* (*e.g.*, in 'Stearettes' or 'Formagules' to avoid vomiting), Holarrhena, Ixora, *Krebisote*, Ipecacuanha sine Emetina, Ipecac. Co. Pulv., *Kosam Seeds*, Magnesium and Sodium Sulphates, *Monsonia Ovata*, Naphthalene, Opium, Plumbi Acetas, Salicylic Acid by Rectal Injection, *Sedeff*, Simaruba, Syr. Ægle Marmelos Co., Tannin, *Trilactine*, *Tylcalsin*, *Tyllithin*, Terebenum purum, Terebinth, Ol., and Stupes of, Yeast, *Dysentery Vaccine*, *Gibson's Sensitized Dys. Vaccine.*

Acute cases should receive 2 drachms Magnesium Sulphate every 2 hours until stools become fæculent or until 2 ounces have been given. If this is unsuccessful, *Bismuth Salicylate* and *Salol* 10 grains each thrice daily for 3 or 4 days—reverting to the Magnesium Sulphate treatment subsequently. *Emetine* hypodermically *after* this saline treatment 1 grain morning and evening subcutaneously. Given promiscuously it is harmful.—J. Carey Evans, B.M.J., i./17,418.

The chapter on Ipecac. and Emetine should be carefully studied for recent treatment—E.P.I. Conessine, Stovarsol, etc.

Ether and Caffeine hypodermically for cases of tropical dysentery when patient *in extremis*.

Amœbic Dysentery and 'Carriers.'—Emetine Injections and Emetine Periodide or Emetine Bismuth Iodide (*vide* Ipecacuanha chapter). Simaruba.

E. Histolytica, Incidence of and other protozoa among healthy entries to the navy.—H. A. Baylis, L. i./19,54.

Salol-coated Ipecac. Pills in treatment of amœbic dysentery and relapses.—Prof. S. K. Simon, Jl. Am. Med. Ass., per L. i./19,429.

Calomel recommended for treatment of obstinate amœbic dysentery, in doses of 0·03 Gm. 12 times a day for 3 days, followed by 3 days treatment with Bismuth Subnitrate (0·5 Gm. 12 times daily), in cases where usual treatment has no effect. Definite disappearance of the amœbæ.—G. Beijnen, per Jl. Trop. Med., Aug. 1/23,256.

Lamblial dysentery well treated with Carbon Tetrachloride.—M. Khalil and I. Shawky, Jl. Trop. Med., Sept. 15/23,285.

Bacillary Dysentery.—Emetine, Silver Gelatose (*i.e.*, Albargin), *q.v.* Enema 1 to 1½ pints, strength 1 grain to 1 ounce.—Leonard Rogers.

Symptomatology of the bacillary and amœbic forms of dysentery.—Sir C. P. Lukis, B.M.J. i./13,1357. See also further abstract of this and other papers under "Emetine." Consult Dysentery in Vaccine chapter.

Dysentery Vaccine. Formalin diluted, rectal injection.

Rhubarb (*q.v.*) stated to be magical but no effect on bacilli in laboratory.

Readily responds to saline treatment and if given early Magnesium Sulphate a drachm every two hours, will relieve the distressing symptoms.—An Indian physician, C. and D., Sept. 1921, p. 378.

Contrary to the accepted view that dysentery is a disease of hot weather and generally spread by flies, the highest incidence of cases at Claybury was found to occur during the winter months. Bacilli of the Flexner type isolated. Primary attacks and relapses may be so slight as to pass unnoticed and there is a possibility of every case remaining a chronic carrier. Very strict observation and a system of permanent isolation are necessary to prevent the spread of the disease.—W. S. Dawson and W. Moodie, L. ii./21,225.

Dysmenorrhœa.—Actæa, Æther Spt. cum Opii, Tinct., Amyl Nitris, Apiol, Belladonna Suppository, *Benzyl Benzoate* (?), Butyl Chloral, Camphor, Cannabis, Cannabis and Chloral, *Castor*, Elixir Ergotæ c. Ferro, Gelsemium

preps., Gossypii, Rad. Cort., *Liq. Cauloph. et Pulsatilla, Guaiacum Resin Cachets, Mist. Dysmenorrhœica, Mist. Morphin Phenazon Co.*, of W. W. W., *Opium, Ovules Morphine, and others*, Piscidia, Potass. Bromid., Pulsatilla, Salix nigra, Saw Palmetto, Serpentaria, Sodii Salicylas, Styptol, Stypticin, Syr. Iodo-Tannicus, *Tab. Ergot Senecin Comp.*, Valerian, Viburnum.

The following has been found useful:—Potassium Bromide 160 grains, Chloral Hydrate 80 grains, Nephenthe 80 minims, Elixir Viburnum Co. 2 ounces, Water to 8 ounces. ½ oz. *t.d.s.p.r.n.ex aq.*

Ductless and other gland Tablets, with or without the addition of antispasmodics, in dysmenorrhea.—L. G. Phillips, B.M.J. i./23,1054. See our pages on Corp. Lut., Pituitary, Ovarian, Testic.

Dyspepsia.—Acid. Carbolic, Acid. Nit. Dil., Acid. Hydroch. Dil., Acidin, *Alkagen Tabs.*, Aloin, Ammon. Carb., Ammon. Chloridum., Arsenic, Atropine Methyl Bromide, *Bisciniod*, Bismuth Comps., '*Bismuth and Pancreatin*,' Cajuput Ol., Calcii Peroxid., Capsicum, *Capsul. Fe. Glyceroph Co., Capsul. Valerian Co., Catha Milk and Glyceroph.*, Cerii Oxalas, *Charbon Naphtole*, Condurango, Creosote, Creosoti Valerianas, Diascordium, Digestin, *Elixir Gentianæ Acid*, Eupatorium, *Fœxin*, Gentiana, Gingerin, Helba, Hydrarg. cum. Creta, Hydrastis, Hydrocyanic Acid, *Hysterionica*, Invert Sugar, Lecithin Elixir and Emulsion, Leptandra, *Liquor Pepsinæ et Caffeinæ, Liq.* and *Tabellæ, Papain et Iridin*, Lithia-Bism. Citras, *Liq. Bism. Tart., Magnesia Cream, Magnesii Hydroxidum cum Carbone, Mist. Carminative.*, Nux Vomica, *Oleum 'Elliott' caps., Oleum Valerianæ*, Pancreatin, Papain Glycerin Acid., Peptonising Powders, Pepsin, Pepsin and Bismuth Tablets, Podophyllin, Quassin, Quinine preps., Rhei Rad. Pulv., Sal Polychrestum, Sedeff, Serpentary, Sodii Bicarb., Sodii Hyposulphis, Sodii Sulphocarb., Sodii Taurocholas, Sodium Bism. Citras, *Sodium Citrate for adding to Milk, Spirit Meliss, Comp., Tab. Bismuth Pepsin et Cascara*, Tinct. Bellad., Tinct. Caryophylli, Tinct. Rhei Aquos, *Trilactine*, Troch. Antacidi., Pulv. Dyspeptic Co.

It has been suggested to conclude each meal in strange places with a few drops of Hydrochloric Acid to reinforce the action of the gastric juice. For general use, should be in larger doses than those usually given, *e.g.*, 10 to 15 drops in ½ pint of sweetened water, as a drink during or after meals.

Investigation of dyspeptics. Classification of dyspepsias into groups—A.—Due to organic diseases of the stomach (including pylorus, duodenum) *e.g.* ulcer, carcinoma, gastritis; B.—Reflex dyspepsias due to organic disease elsewhere in the alimentary tract; C.—From failure to lead a physiological life, *e.g.* over-eating, under-eating, inefficient mastication, drinking, etc.; D.—Due to general states of ill health, *e.g.* debility associated with muscular hypotonus, loss of natural fat deposits and consequent visceroptosis; E.—Due to nervous tricks, nervous exhaustion, worry, hysteria, etc.—John Ryle, B.M.J. i./23,5.

For Fæces Examination see Vol. II.

Dyspnœa.—Æther Spt., Æthyl Iodid., Alcohol, Ammon. Carb. Amyl Nitris, Erythrol Nitrate Tablets, Euphorbia Peplus, Ibogaine, Lobelia, Morphine, Nitroglycerin, Oxygen and Alcohol, *Oxygen injected*, Ozonic Ether, *Pil. Caffein Tri-Iodid. Co.*, Quebracho, Sodii Nitris, Strychnine.

Earache. (*Local use*).—*Atropinæ Liquor or Oleatum (diluted), Chloroformi Vapor, Cocaina cum Oleo*, Glyc. Acid Carbolic 6 grains to ounce, slightly warmed, 2 or 3 drops, Guttæ Spiritus c. Formalin, Menthol-Paraffin Capsules, *Morphinæ Oleatum (diluted), Opii Tinct. cum Oleo Olivæ*, Ung. Lanoboric Camphorat. *See* **Aurinaria**, *also* **Nebulæ**.

Liquid Paraffin for soft wax in the meatus in ear affections.—T. B. Layton, Pr., Apl./20,299.

Eclampsia.—Amyl Nitrite Sterules, Chloral Hydras, Erythrol Nitrate Tabellæ, Morphine, Musk, Nitroglycerin, *Papaverine*, Parathyroid, Pilocarpine, Veratrum, *Thyroid, Sodium Acetate Injections* ½ drachm to the pint. *Routine Treatment.—Purgatives, e.g.*, Jalap, Mag. Sulph., Calomel and Croton Oil. *Diaphoretics.*—Pilocarpine (of great value). *Nerve Sedatives.*—Bromides, Chloral, Morphine in varied dose.

Hirudin, Calcium Chloride, Potassium Chloride, Serum Treatment, removal of colostrum, hot packs and hot air bath, Oxygen, the injection of air or Oxygen and Potassium Iodide into the mammæ, and lumbar anæsthesia have also been used. R. A. Gibbons recommends venesection combined with the endeavour to eliminate the poison and dilution with Saline Transfusion. (Not advised by all.)

Strogonoff's method includes Morphine subcutaneously and Chloral per rectum in alternate doses and at stated intervals. The Dublin method include Morphine (alone) in total doses of ½ to 1½ grains.—T. W. Eden, B.M.J. ii./22,675

Ecthyma.—Ol. Tereb. in Oil injection.

Eczema.—*Alibour Water*, Arsenobenzol and other Arsenic preps., *Calcii Iodid* Calcii Lactas (for œdema, redness and itching), *Colloidal Ag.* and *Hg.*, *Cupr Sulphas and Sulphur*, Harrogate Water, Iron Salts, *Milk and Glycerophosphate* Morrhuæ Ol., Phosphorus, *Sodii Carb.*, *Sodii Citras*, Sulphides, Sulphur *Thyroid, Three Gland, and Four Gland Tablets*, Trilactine (Tabs. and Milk) Vaccine Staphylococcic.

Acid. Boric., Acid Camphoric. Lotio and Ung., Acid Carbolic, Lotio. and Ung Acid Salicylic Ung. and Ol., Acid Picric, Solution ½ to 1% and Ol., *Alkalin lotions*, Anserine Mulls, Medicated, Argent. Nitrat. Sol. (particularly for mucous surfaces of anus, vulva, etc.), Balsamum Lanolinatum, *Bismuth Nit. Glycerin.* Colloidal Silver, Mercury, etc., *Calaminæ Lotio* (et Oleosa), Calcii Chloride Ungt. 6%, *Calcis Aqua, Calcis Linim., Chrysarobini Ung. (weak) Cremor Sicc.* preps., *Creolin, Diachyli Ung.*, Formalin, Moist (for dry condition), Formosyl *Formosyl Huile de Cade*, Hydrogen Perox., *Ichthyol and Collodion and paste of* Iodates, *Kaolin Ung.*, Krebisote Ung., *Lanolin, Lotio Nigra*, Lotio Plumbi Lactat., Formosyl *dusting powder*, *Methylene Blue, Myelocene, Naphthol* Paraffin No. 7, Pellanthum preps., Perfumed Formosyls, Phenoloid Disinfectant, (diluted), Pigment Olei Eucalypt. et Ac. Salicyl, Ung. Hydrogen Perox., Ung. Thorii Oleatis, *Ung. Rumicis*, *Ung. Rusci Co.* Vaccine Staphylococcic, Vleminckx's Solution, 'X' rays and Finsen Light, *Zinci Boras Zinci Cremor*, Zinc Ions (Pustular eczema), *Zinci Oleat. Pulv. and Ung., Zinci Ung.*

Ointment of Liquor Carbonis Detergens 1, Ung. Hyd. Nit. 3, Ung. Simplicis 4. Also Liq. Carbonis Det. in Lotion c. Liq. Plumbi *a.a.* 3 to 4%.

Eczema of Infants, obstinate.—*Thyroid Gland has been suggested.*—(*Standardised preparations*).

Seborrhœic eczema is attributable to a relative acidosis. Alkalis, *e.g.*, the mixture of Langdon Brown as used for control of acidosis in diabetes effectual—Sodium Bicarbonate 1 drachm, Potassium Citrate 30 grains, Calcium Lactate 5 grains, Magnesium Carbonate 5 grains, Chloroform Water to 1 ounce.—H.M. Barber and H. C. Semon, B.M.J. ii./18,245.

Infantile eczema well treated by Purified Coal Tar and Zinc Oxide of each 2 parts, Corn Starch and Vaseline of each 16 parts.—H. MacCormac, L.ii./23,242.

Electric Current Injuries.—*See* **Radiology** Vol. II.

Elephantiasis.—Arsamin, Pituitary Extract.

Emetics.—Apomorphine $\frac{1}{10}$ grain inject. hypod., Antim. Tart. 1 to 2 grains, and Vinum 2 to 4 drachms, Ipecac. 30 grains, and Vinum 4 to 6 drachms, Mustard a tablespoonful, Sodii Chloridum a tablespoonful, Zinci Sulphas 20 to 30 grains. *See also* **Poisons and Antidotes.**

Empyema.—Hydrogen Peroxide for washing the pleura (10%), *Streptococcal*, and Pneumo. Vaccine. Succus Allii.

Douching with Dakin's Solution.

Acute pleural empyema—value of injection of 2% Formalin in Glycerin (Murphy's).—H. Wade, B.M.J. ii./21,150.

Emphysema.—Iodides and Iodine preparations, *e.g.* Caffeine Tri-Iodide. If patient too stout add Thyroid to the Iodine. If excess of lime in the blood Sodium or Potassium Citrate or Limonade Purgative. Keep bowels open with Sodii Sulph.

Encephalitis Lethargica. Due to a filter passing virus.

Aetiology. Not as yet established. Outbreaks have followed epidemics of influenza also of poliomyelitis.

Pathology. A small coccoid organism has been isolated, filtrable, present in the secretion of the naso-pharynx. The cerebro-spinal fluid shows only a moderate degree of lymphocytosis. Urea and sugar are definitely increased. Acetone is present in small amount.

Symptoms. Vary with each epidemic. Stupor is the most characteristic feature, lasting for a varying period. There is a focal disturbance of the nervous system, *e.g.* paresis of the ocular muscles.—Pres., Aug./20, p. 290; Feb./21,65. See also A. Howell, Pr., April 1920.

Keep patient at rest and free from worry; give Ammonium Bromide or Chloralamide if necessary.—Wilfred Harris, B.M.J. i./21,47.

Lethargic encephalitis in England.—B.M.J. i./21,277.

Outbreak in a small school at Radway in Warwickshire.—L. L. Fyfe, L. i./23,379.

Discussion on. Thoughprobably closely allied to polio encephalitis it is not identical.—B.M.J. ii./21,205.

The Ministry of Health have issued a pamphlet (1924) on, revising that of 1921. No specific treatment as yet.

Endocarditis.—Aconite, Arsenic, Belladonna, Caffeina, Collargol, Coronillæ Ext., Digitalis, Fæxin, *Ferric Chloride*, Nuclein and Anti-Streptococcic Serum and *Vaccine*, *Pituitary Extract*, *Pneumo Vaccine*, Veratrum.

Belladonna Plaster, Blisters, Ice Bag, Eusol intravenously.

Autogenous Vaccine and Autogenous Serum (latter if possible). A grave case recovered under —See Strepto. Vaccine.

Endometritis.—Injectio Formalin, Copper Sulphate (and Ionised), *also* Zinc Ions. *Local use of Churchill's Iodine Tinct.* Pond's Tampons.

Swabbing and irrigation with a Solution of Iodine (1 in 10) 1 part and Glycerin 7 parts.—R. Hobbs, B.M.J. ii./21,35. B. Coli Vaccine.

Enteritis.—*See* **Gastroenteritis.**

Enuresis.—Atropine, Belladonna, Ergot, Hyoscine, Hyoscyamus with Sodium Bromide, *Hexamine*, Lycopodium, Potassi Citras, Rhus Tox., Thyroid Extract (Standardised Preps.).—*See also* **Incontinence of Urine.**

Sulphonal 1 grain for each year of the child's life every night for the first week, every other night for the second week, and every third night for the third often permanently cures enuresis.—T. Fisher, L. ii./17, 728.

Epididymitis—Aconite, Antimonial Wine, Iodides, Saline Purgatives.

Atropine Suppos. (1/75 gr.) and hypod., Colloidal Mercury and Silver, *Ice*, Iodine, Guaiacol, Iohydrin, Iodum Oleat. *Lin. Potassii Iodid.*, *Ung. Iodi Intinctum. Heat, with moisture, Mercury, and Belladonna Ointments*, Gono. Vaccine (and Sensitised).

Epilepsy.—Adonis, Æthyleni Bromid., Ammon. Bromid., Amyleni Hydras, Amyl Nitris, Antifebrin, Argent. Cyanid or Nit., Arsenic. Arsen. Brom., Atropine, Auri Bromid. and Chlorid., Belladonna, Borax, Bromalbumen, Bromalin, Bromal Hydras, Brominol, Calcium Bromide, *Calcium Lactate*, Camphora Monobromata, Crotalin, Cannabis, Chloral, *Elix. Calcii Chlorid.*, Hydrargyri Biniodidum, Liquor Auri et Arsenii Bromid. and Liquor Auri et Hydrarg. Bromid., Luminal Sodium, Magnesium Bromide, Manganese Bromide, Mistura Brominol cum Nux Vomica, *Morphine Methyl Brom.*, Nitroglycerin Tabellæ, Ozonic Ether, Palladium Colloidal, Peptone Therapy, Picrotoxin, Potass. Boro-Tart, Potass. Bromid., Pot. Nitris, Santonin, Scutellaria, Sodii Bromid., Sodii Nitris, Thyroid, Urea-Bromine, Valerianates, *Viscum album*, Zinc Salts.

Para thyroid. Prevent constipation.—Cascara, Calomel, etc.

In most cases Bromides are not of the slightest value and in many are actually pernicious.—C. A. Mercier, B.M.J., ii./15,624.

Potassium Bromide 1 ounce, Potassium Bicarbonate ½ ounce, Liquor Arsenicalis 1½ drachms, Liquor Arsen. et Hydrarg. Iodide 3 drachms, water to 8 ounces, Signa: Two drachms in water after meals three times a day. "Marvellous in effects."—P.J., i./15,150.

Fits, epileptic and others.—Anthony Feiling, Pr., July, 1921.

Bromides, Borates, Calcium Lactate, Zinc Oxide, Picrotoxin, Belladonna and Luminal in epilepsy.—Gordon Holmes, L. i./23,501.

Episcleritis:—A seasonal disease of the eye occurring more particularly in certain humid districts—to be differentiated from the diffuse tuberculous episcleritis which occurs in patients with other signs of tuberculosis. The disease though serious enough in itself rarely threatens the integrity of the eye. It is chiefly superficial, involving the episcleral tissues. Antirheumatic remedies are given for two or three weeks or more. Then good results may be obtained from *Colchicum*. Given soon after the onset Colchicum undoubtedly shortens its course, *e.g.* Tincture B.P. (of seeds) in 15 m. doses thrice daily combined with Sodium or Magnesium Sulphate.—P. A. Harry, Pres., May '20,198.

Epistaxis.—Acid. Gallic., Aconite, Acetanilide, Calcium Chloride and Elixir, Ferro-Alumen, Ferri Perchlorid. Hamamelis, Terebinth. Oleum.

Acid. Tannic., Adrenalin, *Alumen*, *Amyl Nitris*, *Ferri et Quininæ Chloridum*, *Ice*, *Hamamelis*, Hydrogen Peroxide.

The best position during an attack of epistaxis is reclining in an easy chair with the hands clasped behind the head, and the collar loosened. No styptic—*plain dry wool is all that is necessary.* Cold may be applied to the nape of the neck

or to the bridge of the nose with the idea of causing reflex contraction of the bleeding vessels; if it is not quickly successful it should not be persisted in. Hot water (at 115° Fahr.) injected with a syringe may prove successful where other means fail. If this fails, introduce a strip of ribbon gauze, about 18 inches long, soaked in equal parts of Adrenalin Chloride (1 in 1,000) and Cocaine Hydrochloride (20%), so as to bring it in contact, as far as possible, with all parts of the nasal mucosa; after 5 or 6 minutes the plug should be withdrawn and an attempt made to discover the bleeding spot by means of a head-light and speculum; should the bleeding spot be discovered it may be possible to control it by direct pressure or by application of the galvano-cautery, or if the bleeding persists the nose should be packed with strips of ribbon gauze.—E. W. Roughton, Pr., Oct. 1910.

Epithelioma.—Radium, *see also* **Cancer.**

Erysipelas.—Acetanilide, Aconite, Aconitina and Granules of, Antifebrin, Antistreptococcic Serum, Belladonna, Digitalis, Ergot, *Fœxin. Fœxin Extract*, Ferri Perchlorid., Mang. Butyrate, Nuclein, Veratrum viride, *Streptococcal Vaccine*, *Buttermilk* internally and locally.

Acid. Picric Pigment, *Acid. Sulphuros. Lotio*, *Argent. Nit.*, *Belladonnæ Glycerin.*, *Calaminæ Lotio*, *Creosote*, *Gossyp. Acid. Boric.*, Ichthosulphol, Iodine, Iodi Tinct. injected (*q.v.*), *Iodum Oleatum*, *Ung. Iodi Intinctum*, Liq. Alum Acet., Liq. Fe. Perchlor., Mag. Sulph. Solution, hot fomentation, Oleogen Comps., Ol. Tereb in Oil Injectio, *Pasta Plumbi cum Cupro.*

Liq. Ferri Perchlor. 20 or 25 m. thrice daily acts almost as a specific. Collodion locally helps.—B.M.J. i./20,352.

Erythema.—Febrifuge Salines, Aconite, Anthemis, *Calcii Lactas*, Salicin, Salicylates, Salol, Trilactine, *Sulphur Stearettes.*

Diachyli Ung., Hazel Foam preps., *Kaolin and Lotio. or Ung.*, *Papav. Infus.*, *Perfumed Formosyls*, *Plumbi Subacet. Lotio.*, *Vaseline*, *Zinci Oxid. and Ung.*, *Ung. Thorii Oleat*, *High Frequency Current*, *Pellanthum preps.*

Erythema nodosum—an acute specific fever.—J. O. Symes, B.M.J. ii./21, 741. Uninfluenced by Sodium Salicylate but cured by Calcium Chloride with local sedatives and rest.—H. Hallam, B.M.J. ii./21,917.

Espundia.—Antim. Pot. Tart.

Exhaustion.—Nervous and Muscular.—Oxygen Inhalation (*and with Alcohol*), Amyl Nitrite, Stimulants, *Catha Milk and Glycerophos.*, Coca preps., Coca Wine. *Cf.* other headings, *e.g.*, **Anæmia, Collapse and Fainting, Debility, Food, Hæmorrhage, Nervous debility, etc.**

Exophthalmic Goitre (Graves' Disease).—Arsenic, Calcium Salts, Fucus, Iron Salts, Pituitary Dried (Posterior lobe), Quin. Hydrobrom. and other preps., Suprarenal Gland, *Sodii Phosph.*, *Thymus Gland*, *Thyroidectin. Fresh Thyroidless Goats' Milk.*

Locally Acid Sulphuros. *Tinct. Iodi Oleosa.*, *Ung. Iodi Intinctum*, *and Iohydrin.* X. Rays.

Digitalis and Strophanthus by allaying the rapidity of the heart's action may give rest and cause patient to seem better. Iodine and Iodides in treatment of simple goitre. The apparent benefit of Sodium Phosphate in Graves' disease and use of Calcium Lactate appear to support the theory that the thyroid plays an important part in the chemistry of the blood salts.—L. i./13,590.

In this disease possibly there is not only an increase in the amount of thyroid secretion formed and absorbed, but in some cases the proportion between the different ingredients of the secretion vary. Suprarenal gland feeding has been tried, but is not well spoken of.—'X' ray treatment is best —G. R. Murray, B.M.J. ii./13,163; L. ii./13,200.

Arsenic, Bromides, Belladonna, Convallaria and Quinine Hydrobromide. —G. R. Murray, B.M.J. i./22,906.

Tryptophane absorbed from the intestine believed to cause exophthalmic goitre.—D. J. Harries, B.M.J. i./23,191,553.

(Iodoform has tendency to produce symptoms of exophthalmic goitre in susceptible persons.)

See also Goitre (simple).

Eye: Optic Atrophy. Retinal extract has been amazingly (unexpectedly) successful.

Eye: Pupil, Contractors of.—*Arecoline in 1% solution*, *Jaborandi and Pilocarpine*, *Opium and Morphine*, *Physostigma*, *Physostigmine.*

Eye: Pupil, Dilators of.—Adrenalin (no refs. to therapeutic use), *Atropine Salts, Cocaine, Daturine, Duboisine, Ephedrine, Homatropine and Hyoscin salts, Hyoscyamine, Nicotine, Oleum Homatropinæ.*

Organic Extracts, *e.g.*, suprarenal and pituitary, have marked effect as pupil *dilators*,—thymus, ovary, muscle and kidney less.

Eye: Local Dilator, but Contracts when given internally in suitable doses—Gelseminine.

Fainting.— *See* **Collapse.**

Fat, to reduce, *see* **Obesity.**

Favus.—*See* **Parasites, Vegetable, on Skin.**

Fetid Breath.—*See* **Breath, Fetid.**

Fetid Perspiration.—*See* **Perspiration, Fetid.**

Fetid Nasal Discharges.— *See* **Ozæna.**

Fever.—Acetanilide, Acid. Salicylic, Aconite, Amidopyrin, Ammon. Acet. Liq. and Carb., *Ammon. Cit.*, Antifebrin, Antimony, Aspirin, *Bisciniod*, Cinchonine, Cinchonidinæ Sulph., *Cryogenin*, Digitalis, Gelsemium, Granules d'Aconitine, Mist. Arsen. Quin. et Ferri., Magisal, Monobromacetanilide. Phenacetin, Phenazone, *Pulvis Quininæ Comp., Potassii Borotartras*, Potass. Acet., Chloras and Citras, *Pilula Antimon. Conii et Quinin.*, Quinine preps., Quinidinæ Sulph., Quinetum, Salicin, Salipyrin, Sodii Salicylas, Tylcalsin Tyllithin, Veratrum Viride, Warburg's Tincture, *Helba, Quinine Acetyl-Salicylate.*

Aspirin, Phenacetin and Dover's Powder combined. Tablets are made.

Fibrosis, Chronic Subcutaneous.—Fucus, Thyroid, Diabetic Diet, Massage.

Fibrositis, Acute.—**Amidopyrin with Aspirin.** *Chloral et Menthol, Pigment Camphoræ.*

Filariasis.—**Organic Arsenic Compounds.** Pepper and Capsicum, *e.g.*, Tinct. Capsici, thought to be prophylactic. Antimony Sod. Tart., also Antim. Pot. Tart. suggested but corroboration needed.

Filarial infection in Macedonia.—J. G. Forbes, L. i./10 654.

Filariasis Expedition to British Guiana. There is evidence that filariasis is a house infection. Blood examination shows that where one or two pronounced cases of the disease are found other members of the house, though apparently healthy, harbour the nematode. More than one species of mosquito is capable of acting as host. It is hoped to determine how many.—B.M.J. ii./21,19.

Filariasis. From observation on two cases the following points call for attention:—(1) Filarial fever is mainly due to lymph stasis. Stagnating lymph has little bactericidal power and is thus liable to frequent infection which may be an additional factor in the causation of the fever. (2) The writer is inclined to believe that filariæ are oviparous rather than viviparous.—S. K. Roy, per Jl. Trop. Med., May 1/23,150.

Fissures of Nipples.—*Acid Boric, Acid. Tannic Glycerin., Alcohol, Argent. Nit. pigment, Cocainæ Hydroch. Liquor, Collodium Flexile, Hydrastis Tinct., Styptic Colloid, Tinct. Benzoin Co.*

Fistula in ano (Tuberculous).—*Hydrogen Perox.*, Inj. Bismuth Subnit, *Iodine Suppos.*, Iodoform Oil after operation, Pot. Permang. (packing with), Zinc ions.

Flatulence.—Acid. Carbolic., Acid. Sulphuros., Æther Spt., Alkagen Tabs., Asafetida, Anise, *Anethol, Aq. Carminativa*, Betol, *Bisciniod*, Bismuth preps., Cajuput Ol., Capsicum, Carbo Ligni, Caraway, Cardamoms, Chloromorphiæ Liquor, Cinnamon, Cloves and Tincture, Coriander, Creosote, Fennel, Magnesia preps., Menth. Pip. Ol., Myristica, Naphthalene, Naphthol, Nux Vomica, Pepsin preps., Sodii Bicarb., *Sodii Sulphis*, Sulpho-carbolates, Tinct. Carminativa, Trilactine, Zingiberis Tinct.

Flies to Ward Off. *See* **Bites and Stings.**

Food Products.—*See* **Chapter on Nutrimenta,** (also *Infant Feeding*), *Casein Preparations.* For invalids are: Benger's Food, *Catha Milk and Glyceroph., Conf. Glyceroph. Co.*, Enema Nutriens, Ferrocarnis, Herogen, Kreochyle, Kolentos, Peptonoids of Beef, *Milk and Glycerophosph.*, Nutrient Suppositories, Peptonised Milk, Peptonised Beef Jelly, Pancreatised Farinaceous Food, Pancreatised Emulsion of Fat, Pavimol, Trilactine, Saccharated Wheat Phosphates.

For Diabetic Foods, see Nutriments, Vol. I. For Bread Standardisation, Flour Bleaching, and Caloric Values of Foods, see Nutrimenta, Vol. II.

Artificial Feeding.—Dextrose (Glucose) Enema, Glucose Injection.

Fractures, for applying extension in.—Sinclair's Glue, Heusner's Glue.

Framboesia.—Organic Arsenic Comps.

Freckles.—*Hazel Foam, Boric Acid Lotion, Corrosive Sublimate Lotion,* Lactic Acid Lotion, Cucumber Ointment, Formosyl (diluted), *Mistura Amygdalæ,* Thorii Oleat. Ung. diluted to a cream, *Ung. Plumbi Carbonatis.*

Frost Bite.—Massage with Cocaine 8 grains, Olive Oil 4 drachms, Lime Water 4 drachms, *i.e.*, Carron Oil with Cocaine. Addition of Liquid Paraffin 1 ounce to the 4 ozs. of Oil useful. When the oil dries on the feet use as dusting powder Camphor 25 grains, Zinc Oxide and Starch of each ½ ounce.—C. Davis. Local application of Eucalyptus Oil, Methyl Salicylate Oil, and a mixture of Castor Oil, Glycerin, and Atropine. In cases of blisters and ulceration, dry dressings, *e.g.*, Boric Acid or a powder containing Bismuth.—C. Miller. True frost bite of the ears—very hot water useful.—B.M.J. i./15,880. Friction with snow or cold water in a cold room best. Friction with Turpentine and Oil or with Spirit and Soap Liniment useful in early stages and after that the limbs should be raised on pillows and wrapped in cotton wool. If blisters form or discoloration shows that gangrene is probable rub with Turpentine to clean the skin or with Spirit containing 1 in 500 Biniodide—or with Iodine.—A. W. Mayo-Robson. Give Lime Salts—*e.g.*, Lactate.—Frances Ede. A stiff ointment made with Suet containing Camphor and 5% Eucalyptus Oil—in a tube like a shaving stick.—R. Douglas Powell. Peroxide 5% solution with Tinct. Iodine 1 dr. to the pint applied as compress 12 hours followed with dry boric wool.—L. Wainwright. Free use of Whale Oil or Vaseline as preventive. Keep the parts *cold* with foot raised slightly—smeared with some ointment. Wrapping up *causes pain.*—B. Moynihan. Where there is moist gangrene, and especially where toxic absorption has taken place—amputation.—R. H. Jocelyn Swan. Counter irritants—Tincture of Iodine, Turpentine, etc., relieve pain for a time, but do not materially affect speed of recovery.—C. Max Page. Boric Zinc and Starch Powder.—F. McG. Loughnane.

Furunculosis, *vide* **Boils.**

Furunculosis Orientalis.—Inj. Antim Ox.. and Antim. Pot. Tart. For Nile boils—Strepto. vaccine.

Gall Stones and **Hepatic Colic.**—Æther Spt., Amyl Nitris, Amyl Valerianate, Anæsthetics, Apium Petroselinum Inf., *Capsul. Sodii Oleat. Comp.,* Chloral Hydras, Chologen, Hexamethylenetetramine, Magnesium Sulphate, Mercurials, Morphine preps., Nitroglycerin, Perles of Ether and Turpentine, Pil. Sodii Oleat, Podophyllin, Salicylates, Sodium Benzoate, Sodium Glycocholate, Various Mineral Waters, *q.v.*

Gall Stones, formation of. There seems little doubt that the deposit of the main cementing substance, calcium bilirubin, depends on the precipitation of this substance from bile by the excess of mucus which is excreted as a result of the catarrhal condition of the gall bladder. Surgical treatment.—F. Macrae, B.M.J. ii./22,1008.

Gall bladder disease. In the early stages of milder cases the symptoms are often reflex and gastric. During an attack of indigestion, pain and tenderness over the gall bladder, with or without fever, the patient should remain in bed, on light (not too milky) diet. Give a mixture of Hexamine, Sodium Salicylate, Sodium Benzoate, Sodium Bicarbonate, Spirit of Chloroform and Infusion of Cloves.—Sir Humphrey Rolleston, L. i./23,40.

Gangrene.—Nitroglycerin Amyl Nitris, Sodium Nitrite.

Acid Carbolic, Acid Nitric, Bromine, Creosote, Hydrogen Perox., Iodine Injection (vagina), Saline Injection (vulva).

Gas Poisoning. *See* GAS under **Antidotes to Poisons.**

Gastralgia.—Acid. Hydrocyanic. Dil., Æther. Spt., Alkalis, Belladonna, *Bisedia, Biscniod,* Bismuthi Oxy-Bromid., Bismuth Oleas, Bismuthi Salicylas, *Bismuth Tart. Solub.,* Bromides, Calcis Aqua, Cannabis, *Catha Milk and Glyceroph.,* Cerii Oxalas, Chloroform, Chloromorphiæ Liq., Coca and Cocaina, Codeina, Creosote, Ginger, Magnesia, Cremor Magnesiæ, Manganesii Oxid., Pepsin, *Sedeff, Iodates, Chloretone, Cyanides,* Menthol, Nitroglycerin, *Trilactine Linim. Sinapis. Ung. Ipecac. et Crotonis.*

Gastric Secretion, to diminish.—Atropine small dose in large vol. of water on empty stomach.

To increase secretion wash the stomach with a weak pilocarpine solution, or employ Sodium Bicarbonate. Magnesium Oxide and Bismuth Oxycar-

bonate have a less stimulating effect. Small doses of Hydrochloric Acid in achlorhydria can only have a psychic effect. They become neutralised by regurgitation of alkali from the duodenum.–T. Izod Bennett, B.M.J. i./23,366.

Gastritis and Enteritis.—Acid Hydrocyanic, Acid Lactic, Alkalis, Ammon. Chlor., Aperfine, Bismuth preps., Bisciniod, Caffeine, Calcii Permang. and Salicylas, Carminatives and Sedatives, Collargol, Hexamine, Hydrastis, Hydrog. Perox., Ispaghula, Kaolin, Mist. Catarrhalis, Pot. Cit., *Saline Transfusion*, Salines, Salol, Sanguinaria, *Sodii Sulphis*, Strontium Salts, Tar Perles, *Trilactine Tablets*, *Milk*, *&c.* *Vide* also **Catarrh, Gastric.**

Gastric Ulcer.—*See* **Ulcers, Gastric.**

Hæmatemesis of.—Adrenalin, Beef Peptones.

Gingivitis, *see* **Gums, Inflamed, also Vincent's Angina.**

Glanders.—*Mallein*, by hypodermic injection. Mercurial Inunctions *Salvarsan.*

Glands, Enlarged.—Calcii Chlorid., Ferri Iodid. and Iron Salts, *Ferri Cacodylas*, *Iodoprotein Tabs*, Iodum, Morrhuæ Ol., Potass. Iodid., Sodii Iodid. *Syrupus Iodo Tannicus.*

Cadmii Iodid. Ung., *Hydrarg. Oleat. and Emplast.*, *Iodi Decolor. Tinct.*, *Iodoform*, *Iod. Linim. and Ung.*, *Iohydrin*, *Pot. Iodid. Ung.*

Glandular fever.—An acute infectious disease, principally of children; rapid enlargement of the cervical glands; less constant enlargement of liver, spleen, axillary, inguinal and other glands. Outbreaks.—H. Letheby Tidy and E. B. Morley, B.M.J. i./21,452.

Glaucoma.—*Physostigminæ Sulph. and Oleum*, *Pilocarpina*, Alkaloidal Oil of Physostigmine, Arecoline.

Iridectomy constitutes a drain for a limited time. It is largely practised in Canada.—H. Smith.

Glossitis.—Hydrarg. Perchlor. in Lotion (2 gr. to 8 ounces).

Glycosuria.—*See* **Diabetes.**

Goitre.—Goitre is prevalent in magnesian-limestone districts, for example, Derbyshire—hence the name 'Derbyshire Neck.' Ammon. Fluorid., Arsenic, *Barii Chloridum*, *Belladonna*, Bromides, *B. Coli Vaccine*, Convallaria, Hydrarg, Biniodid., Hydrastis, Iodum, Naphthol, Phosphorus, Pituitary Gland Dry (entire gland), also Posterior lobe alone, Potass. Iodid., *Quinine Periodide*, Sodii Iodid., *Syr. Ferri Iodid*,. Thymus Gland, *Thymol* in large doses, Thyroid feeding and preps., *Trilactine Milk.*

Acid. Acetic. inj. hypod., *Hydrarg. Biniodid*, *Ung.*, *Hydrarg. Oleat.*, *Hydrarg. Ung.*, *Iodi inj. hypod.*, *T. H.*, Ung. Hyd. Iodid. (diluted), *Iodi Linim. and Ung.* Zinc Salts, Cocaine, Ionisation, 'X' rays.

Experimental production in man by drinking goitrous water of Gilgit. Swelling in the thyroids noted in 15 days,—neck increased in size 2½ cm.—Major R. McCarrison, L. i./13,147,223. Vaccines of organisms from fæces of sufferers used. *Ibid.* 369. *Vide* also our page 895.

An address on Goitre.—H. G. Boyd, B.M.J. ii./19,169.

Small doses of Potassium Iodide (*q.v.*) or Sodium Iodide efficacious in districts where it is endemic but this is quite unsuited for those who already show signs of hyperthyroidism.—G. R. Murray.

On the lack of Iodine theory, Sodium and Potassium Iodides have been added to the salt in Switzerland and to the water supply in U.S.A. *Vide* Sod. Iodid.

Injections of a mixture of Phenol, Iodine Tincture and Glycerin, equal parts. Relieves the thyrotoxicosis, as in *exophthalmic* goitre, but unfortunately relief is only temporary. Quietens the heart's action and reduces mental irritability. —Sheehan and Newcomb, Jl. A.M.A., Jan./20,81. *See also* L. i./20,827.

Acute goitre almost completely disappeared under Quinidine Sulphate given for coincident heart affection.—L. i./23,712.

The principal areas of endemic goitre are the Himalayas, the Alps, the Andes, the Great Lakes of N. America, and districts in Oregon, Washington and British Columbia, the immediate cause being deficiency in the iodine store of the thyroid.—Pres., May '24,189. Adolescent goitre should be treated medically, unless attended by pressure symptoms; colloid goitre patients should receive Iodine up to the age of 25—beyond that medical aid is of no value. After 30, surgery is necessary in adenomata. Exophthalmic goitre is a surgical condition.—J. W. Hinton, *ibid.* 190. Prophylaxis in goitre centres should begin before school age—indeed, it should begin with the mother by means of iodized table salts.—*ibid.* 191. Iodine treatment should be controlled by the B.M.R.

any exaggeration of which forbids the drug.—*ibid.* Graves's disease caused by Iodine administration during menopause.—*ibid.* From 30 to 50% of all persons in Switzerland have no iodine, or only traces, in their thyroids during a large part of the year.—*ibid.* There is an inverse ratio amount of Iodine in surface waters to distribution of goitre. Iodine in water indicates presence in the soil; it is concentrated by plants, and received through food. Iodine is present in igneous rocks—but its liberation from these is slow. Most of the Iodine in the world is in the sea. Atmospheric Iodine is derived from sea spray and the burning of coal. Plea for examination of local waters for Iodine content.—J. F. McClendon and A. Williams, *ibid.*

GOITRE EXOPHTHALMIC, *see* EXOPHTHALMIC.

Gonococcal Arthritis.—Gonococcus Vaccine, Vaginal Douche with Hyd. Perchlor. Lotion (of women), Mag. Sulph. Solution, hot fomentation, Santalol, *Tylcalsin and Tyllithin.* See also Gonorrhœa.

Gonorrhœa.—Buchu, Camphoric Acid, Camph. Monobrom, Copaiba, Cubebs, *Cyperi Caps.*, *Erigeron Oil*, Helmitol, Hetraline, *Hexamin*, Methylene Blue, *Ol. Cedri Atlantic*, Pichi, Potassium Salts, Saline Aperients, Salix nigra, Salol, Santal preps., *Santalol*, also *Santalol-Methyl-Salicyl Caps.*, *Sodium Acid Phosph.*, Saw Palmetto. Sodii Salicyl. (especially acute posterior urethritis) *Uva Ursi*, *Gonococcus Vaccine*, Mineral Waters, *e.g.*, Vittel.

Acid. Carbolic., Acid. Salicyl 2% alcoholic solution compresses, *Acid. Tannic*, Acriflavine, *Argenti Acetas*, *Nitras Injection and Bougies*, *Argent. Iodid.*, *Bismuth Oxyiodid.*, *Bougies Urethral*, *Collapsubes various* (*see Index*), *Collargol*, *Colloidal Ag. and Hg.*, *Glyc. Plumb. Acet.* (compresses), Hydrarg. Oxycyanid., *Hydrarg. Perchlor.*, Hydrog. Perox., Iodargol, *Iodoformi Cereolus*, *Iodof. et Eucalypti Cereolus*, Leistikow's and Neisser's Bougies, Manganese Colloidal, Proflavine, *Palladium Colloidal*, *Potass. Permang.*, *Protargol*, *Resorcin*, *Zinci Acetas*, *Chlorid.*, *Permang.*, *and Sulphocarbolas*, Zinc Sulphanilas. *For female*, *Pessaries of Ichthyol or Iodine*, *Argenti Iodidum*, *Hydrastis*, *Ovules* various, see text, Zinc and other Ionisation.

Marked success from Permanganate Solution, 1 in 1,000 given to men with instructions.—Sir A. Reid and P. H. Boyden, L. i./19,212.

Gangrenous cystitis of gonococcal origin. Bladder irrigated with 1 in 5,000 Silver Nitrate. Patient died of gonoccocal septicæmia.—A. Clifford Morson, B.M.J. i./19,129.

Gonorrhœa of female treated by solution of Methylene Blue 1, Glycerin 25, Water to 100 by swabbing with gauze plug soaked in the solution *in situ* 24 hours.—R. Stafford Ross, B.M.J. i./20,434.

Sodium Taurocholate g.v. thought to be prophylactic.

Gonorrhœa treated by electrolysis. Fluid used is 1% Sodium Chloride and 0·5% Monochloracetic Acid. This acid is less decomposed by the current than the salt and it is able to neutralise the alkalinity which the liberated Sodium would otherwise deposit against the urethral membrane. Current ½ to 1 m.a.—C. Russ, B.M.J. ii./21,1108.

Irrigations with Dichloramine-T 1 in 4,000 also Albargin same strength. Picric Acid 1 in 400 to 1 in 200 is an extremely potent germicide and gives good results when tolerated.—D. Lees, B.M.J. ii./21,480.

Chronic gonorrhœal urethritis, prevention of.—M. W. Browdy Pr, Oct. 1921, p. 264.

Manganese Butyrate has been given.

Over 50% of the men with gonorrhœa coming for consultation found to be over-treated. Every intra-urethral instrument, except a few Teevan's catheters and some gum elastic bougies ought to be burnt.—J. E R. McDonagh, Pr., Jan. 1921.

Growth, to Stimulate.—Pituitary gland dry (anterior lobe) has been thought to. Tethelin (also used locally). *See also* Debility, Marasmus, etc.

Gout.—Acid. Quinic., Acid. Thyminic, Arsenic, Aspirin, *Aspriodine*, Bromal Hydras., Caffein Tri-iodide, Cimicifuga, Colchicine Salicylas (*Capsules*), Colchicum and Colchicin, Elix. Acid Salicyl. Co., Formates, Glycerophosphates, Guaiacum, Hexamine, *Iodine Tinct.*, Iodolysin, *Iron preps.*, Lithium Salts, Lithion, Magnes. et Sodii Sulph., Phenazon and with Codeine, Phenoquin and Neophenoquin, Piperazin, Glycerophosphate, Phenyl-Aspriodine, Phenyl-Sedasprin, Piperazin and Phenocoll Granular Eff., Piperidin Guaiacolas, Tartras, Radio-active Waters, Pistoia Powders, Potass. Acet., Cit., Iod., Pot. Chloride as Table Salt, Sodii Bicarb., Benz., Hippuras, Iodid., Phosph., Salicyl,

Sesquiphos, and Taurocholas, *Solani Ext. Liq.*, *Syr. Ferri Iodidi*, Trilactine, Tyllithin, Urea Quinate, Veratrum.

Amysal, *Borax Solution*, Cade Oil, *Cocaine Ionisation*, Chloroform Liniment, *Collod. Salol*, Ionised Lithium, Methysal Balm, Nauheim Bath Salts, Radium. 'X' Rays are useful. *Ra Emanation Inhalation.* Salicylic Acid. also Iodine Ionised.

A bacterial toxin is the primary factor. Adequate removal of the intestinal contents at the commencement of attack will reduce the symptoms.—Luff.

Calf Lymph Vaccination has improved Gout.

Acetic Extract of Colchicum, B.P.85—is best, the effective dose being 2 to 6 grains.—J. S. Matthews, B.M.J. ii./19,271.

Humoral Syndrome of gout.—A. Chauffard, B.M.J. i./22,745.

Granular Eyelids. *See* Ophthalmia Tarsi.

Granuloma Inguinale.—Antim. Pot. Tart.

Graves' Disease.—*See* **Exophthalmic Goitre.**

Gums Inflamed and Spongy. (*Local use.*)—*Acid. Carbolic.*, *Alumen*, *Anise mouth wash*, Borated Hydrogen Peroxide, Catechu, *Cocaine*, *Cremor Magnesiæ*, *Formosyl Mouth Wash*, *Iodi Tinct.*, *et cum Aconiti Tinct.*, Iodine Colloidal, *Krameriæ Tinct.*, Liq. Antisepticus, Magnes. Lact., *Myrrhæ et Boracis Tinct.*, *Potass. Chlorat.*, *Pastil*, *Tablet and Troch.*, *Pyrethri Tinct.*, *Sodii Chloras and Troch.*, *Thymaglycin.*.

Acute ulcerative gingivitis—Thymol water, and after drying swabbing with 5% Silver Nitrate Solution, and again washing with Thymol.—C. J. Colyer, B.M.J. ii./18,396.

Hæmatemesis.—Acid. Sulph. Dil., Acid Tannic, Adrenalin, Alumen, Argenti Nitras, Ergota, Gum Acacia Sterules Injection, Hamamelis, Iron Persalts, Peptonised Milk, Plumbi Acet., Suprarenal Extract, Terebinth. Ol.

Hæmaturia.—Acid. Gallic., Antimony, Camphor, Cannabis, Erigeron Canadense, Ergota, Hamamelis, Rhus aromatica, Terebinth. Ol.

Vesical Injections of Adrenalin, *Alum*, *Gallic Acid*, *Hamamelis.*

Hæmochromatosis.—A peculiar morbid condition showing an accumulation of free iron-containing pigment in the liver, pancreas and retroperitoneal glands.—T. Shawn Dunn, L. ii./21,334.

A case.—S. Linley Heald, B.M.J. ii./22,542.

Hæmophilia.—Calcii Chlorid. and Lactas, Elix. Sod. Lactat., Magnes. Chlorid., Carbonas and Lactas, Hamamelis, Hydrastis, Iron Persalts, and for surface bleeding see local remedies under Hæmorrhage. *Phenazone in Ferri Perchlor.*, *see Phenazone.* Blood Transfusion.

Hæmoptysis.—Acid. Pyrogallic., Acid. Sclerotic., Acid. Sulph. Dil., Alumen, *Alum. Aceto. Tart.* ***Amyl Nitrite Sterules,*** Atropine, Bromides, Chloral, Digitalis, Ergota, and Ergotin, *Gum Acacia with Saline*, Hamamelis, Morphine, Nitro-glycerin, Phenazone, *Rectal Injection of Calcium Chloride*, Viscum preps.

Atomised Spray of Alum or Monsel's Salt Solution.

Hæmoglobinuria.—Ammonium Chloride, Calc. Lact., Iron Tonics.

Hæmorrhage of Wounds.—Calcium Chloride and *Lactate*, Digitalis, Epinine, Ergota, Ergotin, Ferri et Quininæ Chlorid., Ferro-Alumen, Gelatin, *Gum Acacia with Saline*, Plumbi Acet., Terebinth. Ol. Blood Transfusion. *See also* **Wounds.**

Hæmorrhage from bullet wounds in chest has been controlled by inhalation of Amyl Nitrite.

Local Applications to Wounds and Bleeding Surfaces.—*Acid. Tannic.*, *Albumen*, Amadou, *Anserine Mulls Medicated*, *Bryonia*, *Catechu*, *Cupri Sulph.*, *Cupri Sulphocarbolas*, Epinine, *Erigeron Oleum*, *Eucalyptus Gum*, *Eusol*, *Ferri Perchlorid.*, *Ferro-Alumen. Hamamelis*, Hydrog. Perox., *Monsel's Solution*, Potassium Permanganate, *Proflavine*, *Sphagnum Dressings*, *Styptic Colloid*, *Thromboplastin*, *Tinct. Benz. Co.*, *Zinci Chlorid. Liq.* *See also* **Wounds.**

Eau de Cologne was used by the French Military Surgeons in the war to cleanse wounds. *See also* **Wounds.**

Hæmorrhage, Dental, after Extraction.—

(*Locally*) Adrenalin, Amadou, *Ergotinine Injection*, *Ferri Perchlor.*, Tannin, *Tinct. Benz. Co.*, *Turpentine*, *Zinc Sulphate*, *Zinc Sulphate with Morph. Acet.*

If extensive laceration of the tissue has been necessary, anodyne mouth wash, *e.g.*, Zinc Sulphate 8 grains, Zinc Chloride 6 grains, Morphine Acetate 2 grains. Water to 8 ounces.—Smale and Colyer.

Hot water (blood having an insufficient amount of fibrinogen coagulates at 160° F.) Chloroform Water (2%), Sandarach Varnish.

Potass. Permang. Ung. (4% in Vaseline) or Potass. Permang. and Kaolin with small quantity Vaseline.

Gauze soaked in Oil of Turpentine good.—L. i./22,1006.

Hæmorrhage from Leech-bites, to arrest. *Adrenalin, Alum, Tinct Myrrh., Monsel's Solution.*

Hæmorrhage from the Nose.—*See* **Epistaxis.**

Hæmorrhage, Intestinal—Calcium Chloride, Ergot, Lead Acetate with Camphor or Opium, *Gum Acac. Intrav.*, Suprarenal preps., Turpentine.

Styptic Enemata of Adrenalin, Alum, Copper Salts, Gelatinum Calcii Chlor., *Monsel's Salt, Tannin.*

Hæmorrhage, Uterine and Post Partum.—Amyl Nitris inhaled, *Camphor Inject.*, Curschmann's Inj., Cotarnin, Ergot. preps., Ferri et Quininæ Chlorid., Gum Acacia with Saline, Hydrastin, Normal Serum, Pituitary Ext., Strychnina and Salts, Suprarenal preps., Mistura Ergotæ cum Ferro. Blood Transfusion.

Adrenalin, Alumen, Ferri Perchlorid., Gossyp. and Liquor.

Ergot and Acetic Acid given immediately after birth of child useful to prevent puerperal hæmorrhage.—B.M.J. ii./21,59.

Aluminium Acetate, 2 to 3% solution used, never failed to arrest hæmorrhage from inertia of uterus at childbirth.—Per Pres., Jan. '23,33.

Chloroform by far the commonest cause and often responsible for the death of the child. If anæsthesia is necessary Ether best.—E. Vipont Brown. L. i./23,1338.

Hæmorrhage, Renal.—Hæmostatic Drugs.

Hæmorrhoids.—Suitable laxatives are Cascagar, Conf. Piper., Conf. Sennæ, Infus., and Mist. Senna Co., Pulv. Glycyrrhizæ Co., 'Hindu Dates,' *Sansiviera Ext. Liq., Stillingia,* Sulphur, Trilactine.

Ext. Coca Liq. *q.v.*, an emergency dose acts like a charm.

Acid Boric Ung., Bismuth Oleas, Bism. Subiodate, *Coninæ Ung., Gallæ cum Opio Ung., Collapsubes—Bismuth, Calcium Chloride Injection for bleeding,* Cupri Oleas, *Glyc. and Ung. Chrysarobin, Hamamelid. Liq.*, Iodine Suppos., Lotio Plumbi Spirituosus. Perfumed Formosyls, *Ranunculi Ficariæ Ung.*, Sanusin Sempules, Stovaine Ointment, *Suppos. Bellad. et Morph., Suppos. Cocain et Morph., Suppos. Hamam., Conii et Eucainæ,* Suppos. Hamam. et Hydrarg Co., Suppos. Hæmorrhoidal, *Suppos. Suprarenal et Morph.*, Ung. Adrenalin, *Ung. Bismuth et Cocain,* Ung. Hyd. Subchlor. for irritation, Ung. Thorii Oleat, Zinc Ions.

Injection treatment.—Carbolic Acid 48 grains, Glycerin 2 drachms, Water 2 drachms. Dose: 2 to 6 minims has been injected into each internal pile. 20% solution used,—no danger of thrombosis. Technique described.—L. Mar. 18, 1916, and Pr., June 1922; A. S. Morley, B.M.J. i./21,265; L. i./23,1288.

For details of Injection of Carbolic Acid in Hamamelis see Hamamelis, also Sodium Salicylate.

Injection into each visible hæmorrhoid—drawn out and made prominent by Bier's suction pump—of from 2 to 5 Cc of a 95% solution of alcohol.—Boas, per Clin. Jl., Oct. 3/23,479.

Calamine freely powdered on a pad and tied in position useful.—J. C. Lyth, B.M.J. i./21,265.

Quin. Urea HCl. Injn. *q.v.*

Hair, to Promote Growth of, *cf.* SEBORRHŒA.—*Bone Marrow, Hæmoglobin and Tonics.*

Amyl Nitrite, Cantharides, Jaborandi Liniment, Pilocarpine Lotion, Resorcin Lotion, Sublimate in Spirit Lotion.

Hair, to Remove.—*Barium Sulphide, Calcium Sulphide, Corrosive Sublimate Alcoholic Pigment (with caution),* Glucose Paste, *Pigmentum Thymol, Sodii Sulphid. 25 to 40%, Aq. Sol.,* '*X*' rays, Electric Needle.

Hay Fever.—*For Diagnosis: Protein Skin Tests.* Arsenic, Aspriodine, Belladonna, Calcii Lactas (full doses), Camphor Grindelia, Ethyl and Diacetyl Morph. Hydrochlor., 'Old English Fever Mixture,' Peptone injns., Potass. Iodid., Quinine preps., *Hay Fever Vaccine,* B. Coli and catarrhal organisms, Vaccine Autog. (?). Thyroid Feeding (*Standardised preps.*).

Acid. Salicylic. Pulv., Adrenalin, Bismuth. Co. Pulv., Carbolised Smelling Salts, Compound Asthma Fluid Vapor, Cocain Hydroch. Liquor., Douche of Mercuric Iodide, 1 in 2,000, Eucalypti Oleum, Hydrogen Perox. Nasal Spray,

Menthol, Menthol and Camphor, Nebulæ, Pigmentum Antisepticum, Pimento and Eucalyp. Snuff, *Pollantin, Pulv. Lobeliæ Comp., Quininæ Collunarium, Stramonium, Stramonium Fumes, Suprarenal Extract, Terebene.*

Vestibule of the nose treated with Silver Nitrate 30 grains to the ounce especially two spots, one high up on the outer wall and the second the floor from ½ to ¾ inch back from the orifice. No application made to the mucous membrane. Good in hay fever and rhinorrhœa.—M. Agar, B.M.J. ii./20,125

Headache, Bilious or Sick.—*Caps. Ol. Elliott.*, Chloro-Sodio-Magnesian Aperient, Colalin, Elixir Gentian. Acid., Euonymin, Guarana, Hydrastis, Iridin, *Liq. and Tabellæ Pepsinæ et Caffeinæ*, Ol. Ricini Aromat., Phenacetin, Phenazone, Podophyllin, *Sodii Citras*, Sodii Phosph. Efferves., Sodii Sulph. Efferves., Sodio-Magnes. Sulph. Efferves., Sedeff, Sodio-Mag. Sulph. with Caffeine.

Headache, Congestive or Inflammatory.— Actæa, Colchicum, Ergot, Ammon. Chlorid., Antimony, Hydrarg. Subchlorid., Maricol, Phenazone, Ricini Ol., Salicylates of Sodium, &c., *Sedeff*, Trilactine, Veratri Viridis Tinct.

Headache, Nervous.—Acid Hydrobromic, Acid Hydrocyanic, Actæa Amidopyrin and Amidopyrin Aspirinate, Ammon. Arom. Spt., Arsenic, Atropine, Auri Bromidum, Belladonna, Bromides, Butyl Chloral, Caffeine, Camphora, Cannabis, Chloralamide, Cimicifugin, *Elix. Acetanilid. Co.*, Elixir Anti-Neuralgicum, *Elixir Caffeinæ*, Ferri Valerianas, Gelsemium, Guarana, *Ibogaine*, Iodo-Caffeine, Iodo-Theobromine, Iron Salts, Kola, *Magisal, Phenyl Sedasprin*, Methylene Blue, *Migralgin*, Nitroglycerin, Phenacetin, Phenazone, Pulv. Calc. Glyceroph. et Lac. exsicc., Quininæ Valerianas, *Sedasprin*, Syr. Neurotonic; *Sedeff*, Sodii Citras, *Theobromine, Lithium Benzoate*, Trilactine, *Tylcalsin, Tyllithin.*

Nitroglycerin with Strychnine (Tabellæ).—Gowers.

A prescriber's note—per C. D.—If of *dietary origin*, 20 grains of sodium bicarb. with tinctures of gentian and cardamoms will probably have the desired effect. If *due to fatigue*, 10 grains of phenazone with 1 dr. of spt. ammon. arom., and perhaps a little gentian, is indicated. If of *influenzal origin*, 10 grains of sodium salicylate with 6 grains of phenacetin and the same adjuvants will probably act as magic.

Locally. Formosyl Cone.

Heart.—See **Cardiac Tonics** and **Dropsy, Cardiac,** also Vasodilators.

Heel, Painful, caused by numerous influences. A prevalent cause of acute pain of sudden onset round the heel is a true teno-synovitis of the tendo Achillis. Compound Mercury Ointment is curative.—W. Fletcher Stiell, Pr., May 22/345.

Hepatic Colic.—*See* **Calculi, Biliary.**

Hernia (*Local use*).—*Intraspinal Injection* of Anæsthetics *prior to operating.*

Herpes Zoster.—*Arsenic e.g. Fowler's Solution*, Morphinæ inj. hypod. (for pain), Quinine preps., Salines and Saline Aperients. General Tonics.

Anodyne Colloid, Carron Oil (or mixed with *Zinc Oxide Ointment* 3 : 1), Bismuth Oleas, Calamine Lotion, *Cocain preps., Collodium, Hydrarg. Ammon.*, Cremor Sicc. preps., *Ung., Hydrarg. Oleat. Ung., Hydrog. Perox., Ichthyol, Menthol pigment or Unguent* (for pain), Perfumed Formosyls, Quinine, Ionisation, *Zinci Oleat. Ung., Zinci Ung.*

Paraffin in the form of an occlusive dressing applied daily gives quick and complete relief from pain in herpes zoster.—H. Fox, per Clin. Jl., Mar. 7/23, 119.

Herpes zoster ophthalmicus. The following by Gowers gave relief of pain: Caffeine Citrate, Sodium Iodide, Sodium Salicylate, Salicin, of each 5 grains, Phenazone 10 grains. One powder every four hours as required.—S. Lodge and W. O. Lodge, B.M.J. i./23,1085.

Picric Acid in Zona. The following lightly applied every second day effects a cure—in no case more than 5 applications necessary. Picric Acid 50 Gm., Sulphur, Ether and Pure Alcohol 50 Gm.. of each.—per Pr., Sept. '23/230.

Hiccough.—Adrenalin Solution, Æther. Spt., Amyl Nitris, Benzyl Alcohol for persistent, Camphora, Capsici Tinct., Chloral, Chlorof. Spt., Extract. Ergotæ Liq., Liq. Ammon. Acet., Morphine preps., Musk, *Ol. Succini*, Pilocarpine Hydroch. Sedeff, Sodii Bicarb., Trilactine, Valerian Tinct.

Ether intramuscularly (25 to 30 minims) for relief of hiccup.—C. L. Gibson, per Jl. Trop. Med., April 16/23,127.

Hodgkin's Disease.—See **Lymphadenoma.**

Hookworm.—*See* **Ankylostomiasis and Worms.**

Hordeolum.—*Argent. Nit., Belladonnæ Fotus, Hydrarg c. Morphina Oleat. Iodi Tinct., Ung. Hydrarg. Oxidi Flavi, Ung. Metallorum.*

Hydrarthrosis.—*Allium Scales* to surround joint. Cataplasma Salicyl. Co., Scott's Dressing. *See also* ŒDEMA.

Hydrophobia.

Immediate use of Actual or Electric Cautery, or Nitric Acid or Argent. Nit. Solid, or other caustic paste at hand. Anti-rabic Vaccine.

Hyperchlorhydria.—Alkalis, Belladonna, Bismuth and Pancreatin, see also *Vol. II., Exam. of Stomach Contents, 'Belladonna best to inhibit secretion, Bismuth Tart. Solub.*, Bismuth Calc. Phosph., Kaolin, Cerium Oxalate, Glycogen, Mag. Carb. Lev., Nux Vomica (large doses), Ol. Olivæ, Pepsin, Sedeff.

Hyperhidrosis.—*See* **Perspiration, excessive.**

Hyperpiesia and Hyperpiesis. A monograph on the study of 47 cases by H. Batty Shaw. Its cause is a toxin of protein origin and pre-renal in its site of production. Review.—L. i./22,437.

Hypertrichosis.—*See* **Hair to Remove.**

Hypnotics.—*See* **Insomnia.**

Hysteria.—Actæa, Allii Ol. Essent., Amyl Nitris, Asafetida, Auri Bromidum, Auri Chlorid., Belladonna, *Brom-albumen*, Calcium, Magnesium, Manganese and other Bromides, Cannabis Indica, *Ibogaine*, Iron Salts, *Liq. Antihystericus*, Lupuli Tinct., *Magisal*, Nux Vomica, Ol. Succini, Ovarian Gland, Phosphorus, Pulsatilla, Quinine Preps., *Sedasprin*, Sedeff, Spirit Ammon. Arom., Syr. Pilocarpin et Pot. Brom., Strychnine, Sumbul, Valerian and Valerianates, Validol, Zinc Salts.

Ichthyosis.—*Resorcin* (*q.v.*) and *Salicylic Acid.*

Impetigo.—Remove crusts with Olive Oil or by Boric Starch Poultice, then 10% Ammoniated Mercury Ointment, *Brilliant Green Ointment*, Eusol, and *see* **Eczema.**

Bockhart's impetigo. Lotion of Potassium Permanganate 15 grains, Sodium Bicarbonate 10 grains, water 1 ounce, applied daily with satisfactory results. —J. A. Scott, B.M.J. ii./22,977.

Impotence.—Arsenic, Auri et Sodii Chloridum, Cannabis Indica and Cannabin Tannas, Cantharides, Coca and Cocaine, Damiana, Easton's Syrup, Ferri Perchlorid., *Formates*, Glycerophosphates, Gokhru, Ibogaine, *Muirapuama*, Nux Vomica, Phosphorus, *Pilula Potentin Co.*, *Piperazina*, Sanguinaria, Strychnine, Testicular Extract and Injection. *Theobromine Lithium Benzoate*, Yohimbine, Zinci Phosphid.

Yohimbine to our knowledge caused unpleasant subsequent effects.

Incontinence of Semen.—Arsenic, Auri et Sodii Chloridum, Belladonna, Bromides, Camphor Monobromide, Chloral, Ergota, Ferri Perchlorid., Ferri Phosph. and Ferri Phosph. c. Quin. et Strych. Syrup., Gokhru, Hyoscine, Hyoscyamine, Phenazone, Salix nigra.

Incontinence of Urine.—Ammon. Brom., Arsenic, Belladonna, Brominol, Buchu, Calcii Glycerophosph., Calcii Phosph., Calomel to regulate bowels, Camphor Monobrom., Cantharides, Ergota, Ferri Iodid., Ferri Perchlorid., Gokhru, Hyoscyamus, Lycopodii Tinct., Naphthalin, Nux Vomica, Phenazone, Potass. Cit., Rhus Aromatic Ext. Liq., Liq. Strychninæ (Ringer), *Thyroid Gland* (Standardised Liquor or Tablets).

See also abst. of paper by F. Hernaman-Johnson, p. 236.

Causes of frequency of micturition.—W. K. Irwin, Pr., Mar. 22/203.

Indigestion.—*See* **Dyspepsia.**

Inebriety.—*See* **Alcoholism.**

Infant and Invalid Feeding.—Pasteurised Milk, Dried Milk, Foods A, B and C., Herogen, *Pulv. Calcii Glycerophosph. c. Lacte exsicc.*, *Peptonising Powder for humanising milk and Peptonised Milk*, *Trilactine Milk*, *Whey Powder*, *Lactalbumen*, Omnevit pulv. and caps., Glaxo, *Goats' Milk*, Sodium Citrate Tablets (and with Sodii Bicarb.). Tablets to add to ordinary milk to increase digestibility, Koumiss, see Chapter 'Nutrimenta,' Accessory Food Factors, etc.

Inflammation.—Acetanilid, Aconite, Antimony, Belladonna, Digitalis, Gelsemium, Granules d'Aconitine, Hydrarg. Subchlorid. and cum Opio, Opium, Phenazone, Quinine, Salicin, Veratrina.

Cataplasm Salicyl. Co., Glycerinum Plumbi Subacet., Iodine Ionised, *Hirudo*

Influenza.—*Aceto-Salicylic Acid*, Aconite, Acetanilide, Actæa, Æth. Nit. Spt., Ammon. Acet. Liq., Ammoniæ Aromat. Spt., Antimonii Tartras, *Asprio-din*, Belladonna, Camphor, Cinnamates, Cocain. Hydroch. Liquor, *Colloidal Metals*, Elix. Cinchonidine, *Formates*, *Gelsemium*, Ipecac. Co. Pulv., *Iodi Tinct.*,

Inhalations of Eucalypti Ol. Menthol, *e.g.*, Ozonic Inhaler (clears the head), Magisal, Musk for heart failure, Menthol and Camphor, Opium and Morphine preps., Phenacetinum, Quinine preps., *Phenyl Sedasprin*, Salicinum (large doses), Salipyrin, Salol, *Sedasprin*, Sod. Bicarb., Sod. Nucleinate Intram. Inj., Sodii Salicylas, Tinct. Quinin. Ammon., Tab. Ammon. Quinine Comp., *Influenza B. Vaccine*, also Comb. Cold Vaccine, and Sensitised Infl. B. Vaccine, *Steriloid Quinine*, *Tycalsin*, *Tyllithin*.

Blood Transfusion.

For *sweating of*—Amyl Nit. $\frac{1}{30}$ minim doses internally

For post influenzal cough, *Lysol Inhalation*, Mist. Apomorph. Co.

For an ordinary severe case give Aspirin and Dover's Powder, *aa*. 10 grains, as early as possible after customary aperient, and repeat in 6 to 8 hours; follow by a simple diaphoretic. For *headache*, if necessary, Phenacetin 5 grains with Caffeine 2 grains. For foul tongue Sodium Bicarbonate and Sodium Sulpho-carbolate. For *vomiting* reduce feeds and give Tinct. Iodi 1 m. hourly for 6 doses. For *cough*, Syr. Cocillanæ Co., Syr. Codein, or Linctus Terpin et Heroin. For *sleeplessness*, Bromide or Paraldehyde.—Sir Thos. Horder, L. ii./18,694, 871. See also B.M.J. ii./19,695.

Influenzal Septicæmia, essential feature *B. influenzæ* with *S. pyogenes longus* or a *diplo streptococcus* as secondary organism. This latter organism plays an important rôle in the fatal cases.—A. Abrahams, N. Hallows, and H. French, L. i./19,1 *et seq.*

Aetiology of Influenza.—Immunity acquired after 2 or more innoculations with B. Influenzæ.—J. Speares, M.P.C. i./19,9.

Apparent immunity from Influenza at Christ's Hospital School.—Results of Inoculation. Only one case of Influenza occurred of 633 boys treated.—G. E. Friend, L.i./19,105.

Formalin Spray, 6 drachms of 40% solution to 1¾ pints of water checked Influenza.—A. Wylie, L. i./19,256.

Cinnamon Oil and Formalin destroy or inhibit growth of Influenza B.—F. T. Marchant, L. i./19,392.

Complications, Treatment of.—A. J. Eagleton and H. H. Butelier, L.i./19, 560- 572

Media for culture of *B. Influenzæ*.—Blood boiled in Agar, etc.,—A. Fleming, L. i./19,138.

Fumes such as *Nitrogen Peroxide* and *Sulphur Dioxide* are inimical to the Influenza virus. Possible practical application.—A. Gregory, B.M.J. ii./19. 523.

Pituitary Extract for bronchial congestion with cyanosis and dilatation of the right side of the heart. Tones the heart and bronchial muscles or relaxes them if there is spasm.—W. Crofton, B.M.J. i./19,240.

Hexamine Solution 25%. *Dose* 8 Cc. intravenously well tolerated.—Bull. Soc. Med. des Hop.—per Pres., Apl. '19.

Mercuric Chloride 0·01 Gm. in 1 Cc. Normal Saline daily intravenously. No untoward by-effects from these large doses. Even grave albuminuria not contra-indicating—it improves instead of growing worse. Begin at first sign of congestion of the lung.—Pres., Apl. '19.

Calomel in small continued doses with good results.—Pres., Apl. '19.

Loss of smell following influenza. Give a long continued course of Strychnine.

Post-influenzal Broncho-pneumonia. Serum treatment from patients convalescent from, was beneficial in numerous critical cases. 100 Cc. intravenously, two injections in 24 hours.—Pres., Apl. '10.84.

Aq. Laurocerasi (containing 0.1% HCN) given intramuscularly and intravenously in 1 Cc. doses with some advantage.—Pres., Apl. '19,84.

Tinct. Iodi B.P., 20 to 30 m. diluted with 9 Cc. of Normal Saline intravenously tolerated and therapeutic effect shown generally in 24 hours by fall in pulse rate and temperature. Albuminuria no contra-indication. Dense albuminuria in one case cleared up two days after first dose.—D. M. Baillie, L. i./19,423.

A gargle of *Chloral Hydrate* 2% every half-hour. First Calomel 4 grains followed in 3 hours with ½ oz. Magnesium Sulphate. This rids the system of toxins, and *the gargle prevents further lodgement of organisms in the throat* which is the site of infection.—Med. Rev. of Rev., Feb./20, p. 60; per Pres., Feb./21,85.

Blindness as an immediate sequela of Influenza. Recovery.—S. E. Denyer, B.M.J. i./22,223.

Ammoniated Tincture of Quinine 20 minims, Sodium Salicylate 10 grains, Glycerin ½ drachm, water to 1 ounce—forms a clear mixture. Possibly a Quinine-Sodium Salicylate formed soluble in the Ammonia.—N. M. Falkiner, B.M.J. i./23,958.

See also PNEUMONIA.

Insanity.—Fresh Brain Extract has been tried. *See also Mania.*

Insect Bites, *vide* **Bites and Stings,** also PARASITES and PEDICULOSIS.

Insomnia.—Acetanilide, Ammon. Bromid., Amyleni Hydras, Antifebrin, Bromal Hydras, Bromidia, *Bromoprotein*, Butyl Chloral, Camphor, Cannabis Indica and Cannabin, Chloral (not now advised), Chloralamide, Chloralose, Chloretone, Chlorobrom, Coca, Codeina, Codeonal, Diallyl-barbituric Acid, Diamorphine, *Guttæ Castorei Comp.*, Hop pillows, Hyoscyamine, *Lactucarium*, Liquor Bromo-Chloral Comp., Lupulin, Morphine, Narcophine, Nitroglycerin Tabellæ, Opium, Paraldehyde (*recently intravenously*), Phenazone, *Phenyl Sedasprin*, Pituitary Extract (?), Potassii Bromid., Quinine at bedtime, Scopolaminæ Hydrobromid., *Sedasprin, Sedeff*, Sodii Bromid., Soneryl, Stramonium, Strychnina and its salts, Sulphonal, Trional, Urethane, Valerian, Veronal, and Veronal Sodium.

Opium should never be employed as hypnotic and the bromides of little use. Paraldehyde best mere 'nightcap' in mild cases (heroic doses are mentioned, ½ oz. on occasion every four hours); useful for quick action. Sulphonal apparently safe up to at least a drachm a day divided. Hyoscine is the strongest in emergency, and is safe up to 1/50th and probably up to 1/33rd grain hypodermically, *e.g.*, in acute delirious mania.—F. Wyatt Smith, Pr. Sept. 1921.

Sleep and Sleeplessness.—Choralamide, Veronal, Luminal and Paraldehyde mentioned.—W. Johnson Smyth, B.M.J. i./23,226.

Intertrigo.—*Acid. Boric. and Ung., Acid. Tannic Glycerin., Bismuth Ointment, Calaminæ Lotio, Calcii Carb., Calcis Aqua, Camphor,* '*Cremor Sicc., preps.*, Formosyl, *Formosyl Cream, French Chalk, Fuller's Earth,* Hazel Foam' Iodi Tinct. diluted with 3 times volume with Eau de Paris, Iodine Colloidal, Liquor Carbonis Detergens diluted with equal vol. or twice volumes of Eau de Paris or Ichthyol diluted with water 50 or 60 times, *Kaolin, Methylene blue, Oleogen Compounds*, Pellanthum preps., Perfumed Formosyls, Scarlet Ung., Ung. Thorii Oleat, *Vaseline, Zinci Cremor and Ung., Zinci Oleat Pulv, Zinc Salicylas.*

Intestinal Antiseptics.—*See* **Antiseptics.**

Intestinal Worms.—*See* **Worms.**

Iodism.—Acid Sulphanilic. Preps. containing ammonia.

Iritis.—Find out cause.—Colchicum, Hydrarg. Perchlorid., and Subchorid., Iodum, Oil of Gaultheria, Potass. Iod., Pilocarpine, Salicylic Acid, *Tylcalsin intrav.*

Atropina cum Vaselin., Atropinæ Sulph. Guttæ and Lamellæ, Belladonna, Duboisine, Dionine, Scopolamine, *Sterules various.*

Itch.—*See* **Scabies.**

Jaundice.—Acid. Nitro-Hydroch. Dil., Aloes, Ammon. Chlorid, Benzoates, Elixir Gentianæ Acidum, Calcii Chlorid., Euonymin, Ferri Succinas, Hydrarg. cum Creta, Hydrarg. Subchlor., Hydrastis, Iodoform, Iridin, *Manganese Sulphate*, Pilocarpine, Podophyllin, Salol, Sennæ Co. Mist., Sodii Phosphas and Sodii Phosph. Efferves., Sodii Salicylas, Sodii Succinas, Sodii Sulphas, and Sodii Sulph. Efferves., Taraxacum. Contramine for Salvarsan jaundice.

To relieve skin irritation dilute Nitric Acid Lotion or Sodium Bicarbonate Solution, Hazel Foam, Liquor Carbonis., Ung. Rusci. Comp., Formosyl Cream.

Diagnosis of, *v.* Bile in Urine, Vol. II.

JAUNDICE, INFECTIVE. *See* Vol. II.

Jaundice, with special reference to types occurring during the war.—Lettsonian Lectures.—W. H. Willcox, L. i./19,869,929. See also *ibid.* ii./19, 419.

Grave familial jaundice. The prognosis for infants' life is bad. It is thought to be due to fœtal toxæmia of maternal origin. Prophylaxis should consist in care of the mother's diet and administration of intestinal and biliary antiseptics, *e.g.*, Hexamine, Sodium Salicylate, minute doses (1/20th grain) of Calomel, Naphthalene Tetrachloride, Salol, Guaiacol. Ballantyne recommends Calcium Chloride. The infant should have Calomel in small doses.—Sir H. Rolleston, Pr., Jan., 1920. See also A. P. Agnew, Pr., Sept., 1920, p. 217.

Kala Azar.—Organic Arsenic Comps. *q.v.*, Antimony Oxide, also Antimony Pot. or Sod. Tart. Injection. Fourneau '309' and Bayer '205' have recently been reported on.

Kala-azar and the bed bug. Though a suspected agent, this still waits final verdict.—L. i./22,400.

Pathology and transmission of Kala-azar. Support to the theory of transmission by some blood-sucking insect.—L. ii./22,1138.

Endemic in Assam, where it occasionally becomes epidemic. After being long quiescent, the disease became active again in 1917.—B.M.J. i./23,430.

Kidney Permeability Tests.—Methylene Blue, Indigo-Carmine, Phenol-sulphone-phthalein, Phloridzin, *vide* Vol. II.

Thorium-Sodium Citrate as pyelographic medium.

Estimation of non-protein nitrogen of the blood, urea concentration, blood urea, etc., in renal disease.—Prof. Maclean, B.M.J. ii./22,1067. See also *Vol. II.*

Keloid.—*Formalin Injection, Mist. Hydr. Biniodid.*, Radium, "X" Rays.

Labour.—*See* **Uterus, to Contract.**

Laryngismus Stridulus.—Aconite, Amyl Nitris, Belladonna, Bromides, Chloral, Coninæ Hydrobrom., Emetine, Gelsemium, Piscidia.

Laryngeal Ulcers.—Lactic Acid; also Quinine HCl. Acid, as pigment and nebula.

Laryngitis.—*Find out cause.* Aconiti Tinct. or Pastil., Ammon. Acetat. Liq. and Ammon. Chlorid., Antimonials, Antipyrectics, Calomel, Codeine Jelly, Creosote, Cubebs, Diacetyl and Ethyl Morphine, Glycaphorm, Iodoprotein, Linctus (various), *Lichenoids*, Phenyl-Aspriodine, Pulsatilla, Terebene.

Counter-irritation, fomentations, leeches.—Adrenalin, *Inhalations of Ammon. Chlorid., Sprays of Creosote, 'Menthol in Oil,' Thymol, Tinct. Benzoin Co., Belladonna and Conium, Juniper,* Æther Acetic, *Insufflatio Morphinæ et Bismuth, and of Catechu, or Menthol, or Tannin, Oxygen* and Alcohol Inhalation, *Pastils of Glyco-gelatin* (*see list*), *e.g.*, of Ammon. Brom., *Pigments of Cocaine, Menthol, &c.*

Leishmania Affections.—Antimony Ox. inj. and other Antimonials. Antim. Pot. and Sod. Tart. and Arsenicals.

Local leishmaniasis (Delhi sores etc.) well treated by scraping and lightly applying solid KOH and dressing.—E. J. E. Risk, B.M.J. i./21,267.

Leprosy (see also *Vol. II.*).—Antimony Colloidal, Chaulmoogræ Ol., Emulsion and Injection, Ethyl Ester of Chaulmoogra, Intramine (?), *Guaiacol internally and locally*, Sodium Morrhuate injected, Sodium Chaulmoograte 'A' Pills, and 'C' Sterules, Magnes. Chaulmoograte, Sodium Soyate.

Increased Calcium retention in 2 cases of leprosy. Apparently excretion of Calcium increases as disease advances and there is more than average retention in early stages.—A. Boulay and M. Leger, per Jl. Trop. Med., Mar. 15/23,102; Apl. 16,23,133. Suggestion that Calcium should be supplied in the food.—F. P. Underhill and Co-workers, T.D.B., Vol. 17/21,273. Nodular leprosy treated with tissue vaccine.—A. W. Williams, per T.D.B., Vol. 17/21,295.

Leucocythemia.—*Benzol Capsules.* Arsenical preparations, Cacodylates, Digitalis, Glycerophosphates, Iodine, Iodoprotein, Omnevit, Iron Salts, Marrubin, Phosphorus, *Syrupus Iodo-Tannicus*, Syrupus Tann-Iodo Phosphoratus, "X" ray treatment.

Leucorrhœa.—Hæmatoxylin, Iron Salts, Manganese preps., Mineral Acids, Myrrh, Vegetable Tonics, Fæxin Ext.

Acid. Boric. Lotio, Acid. Carbolic. Lotio, Copper, Zinc or Iodine Ionisation (for obstinate discharge), *Alumen, Ammonio-Ferric Alum, Boric Acid in Powder*, Formosyl Pessaries, Kaolin Insufflation, *Hydrastis*, Iodates, Mercuric Chloride, Ovarian Ext., Ovules of Alum or Carbolic Acid, etc. (see list), Naphthol. Pess. B. Ac. Lact., *Pessus Quininæ, Potassii Permang.*, Quinine Hydrochloride, Tampons, Tannic Acid, *Sodii Bicarb. and Belladonna* (*Ringer*), Sodii Perboras, *Tannin and Alum Injection, Zinci Sulphocarb.*

Leukæmia, *see* **Anæmia.**

Leukoplakia.—Radium.

Lice to kill. *See* **Parasites, Animal.**

Lichen planus.—Acid Phosphoric c. Strych., Arsenicals.

Acid. Salicyl. Ung.

Liq. Carbonis Deterg. 10 m. to 1 dr. to oz. of water or Calam. Lotion. See also Eczema.

Liver Abscess, *vide* Abscess, Liver.

Locomotor Ataxy.—Alum. Chlor., Arg. Nit., Arsamin, Arsenobenzol, Cannabis, *Cerebral and Myelin Tablets together*, *Chloral. Formamide*, *Colloidal Mercury and Silver*, Ergot, *Hexamine*, Hyoscine, Inj. Ac. Nucleinic, Iodinol, Iodoprotein, Keratin, Lipiodol, Mercurialised Serum, Mercury Benz., Morphine, Morrhuæ Ol., Nitroglycerin, Omnevit, Pot. Brom., Pot. Iod., *Quinine*, *Sod. Brom. Intrathecal injection*, Sod. Cacodyl., Sodii Salicylas, Strychnine (with acid), *'Three Gland' and 'Four Gland' Elixir and Tablets.*

Mercury Inunctions. Cataphoresis of Cocaine Solution, Radium. Intrathecally. Salvarsanised blood from sane patient.

Lumbago.—Ammon. Chlor., Aspirin, Aspriodine, Belladonna, Camphor Monobrom, Cimicifugin, Colchicum, Elixir Acid Salicylic Co., Morphine, Phenazone, Phenyl Sedasprin, Potass. Iodid., Quinine ,Sedasprin, Salicylates, Sedet., *Tylcalsin*, *Tyllithin*. All Purgatives, *e.g.*, Chelsea Pensioner, Guaiacum and Sulphur.

Aconite Liniment, *Amyl Salicylate*, Amysal, Anserine Mulls Medicated, *Atropinæ Linim*, *Belladonnæ Linim.*, *Capsici Linim.*, *Chaulmoograte*s, *Chloroform Liniment*, Heat Rays, *Iodum Oleatum*, Menthol Linim. *Menthol Plaster*, *Methysal Balm*, Guaiacol, Iodine and Oleogen Salicylicum, *Opii Linim.*, Ung. Iodi Intinctum, *Picis. Empl.*, *Veratrinæ Ung.*, "X" Rays. Static Electricity.

Lupus.—Ac. Nucleinic Inj., Arsenic, Cacodylates, Gynocard, Ol., *Hydrargyri Biniodidum*, Iodum, Morrhuæ Ol., *Myelocene*, Phosphorus, Quinine preps. Salicin, Thyroid Gland, Tuberculins.

Acid. Chromic. (and Chromic Ions ?) *Acid. Cinnamic*, *Acid. Hydrochloric. Acid. Lactic.*, *Acid. Pyrogallic Emp. and Ung.*, *Acid. Salicyl.* 50% *Ung.*, Argenti Oleas, Arsenobenzol, Bism. Oxyiodogall., Chaulmoogra and Ethyl Esters of, Sod. Morrhuate, *Bismuth Iodas*, 'Brass Paste' and preps., *Camphora Salicylata*, Carbonic Snow, Carbon Tetrachloride c. Iodine, Chaulmoogræ Ung., *Cicatricine*, Cupri Oleas, *Ethyl Chloride*, *Finsen Light*, Formosyl, *Hydrarg. Nitras*, Hydrogen Peroxide, Iodine Ions, *Iodoform*, Lactic Ions, *Lassar's Paste*, *Oleata*, *Oleogens*, *Pitchblende Ointment*, Potassii Permanganas, *Radium*, *Resorcin*, Thiosinamin, Thymol Iodide, *Tuberculin*, Uranium Oxid. Ung. and Injectio, "X" Rays, *Zinc Chloridum*, Zinc and other Ionisation, *see* Iontophoresis.

Fehling's Solution injected in lupus.—G. N. Meachen, L. i./19,528.

Diathermic Treatment.

Lupus Erythematosus. Arsenicals, Quinidine Caps. and Elix.

Local.—Acid. Carbonic., *Hydrarg. Biniodid.*, Iodised Carbon Tetrachlor., *Myelocene*, *Finsen Lamp*, *Radium*, *Ung. Thorii Oleat.*, *'X' Rays.*

Local.—Acid. Carbonic., *Hydrarg. Biniodid*, *Myelocene*, *Finsen Lamp*, *Radium Ung. Thorii Oleat.*, *'X' Rays.*

A complete discussion on treatment, etc.—J. M. H. McLeod, B.M.J. ii./13, 313.

Mercuric Chloride in Spirit 1 in 240 alternately with a Zinc, Boric Acid and Bismuth Ointment—more useful than anything.—R. Thomson, Pharmacist, Elgin, N.B.

Recent observations. For producing hyperæmia and promoting cicatrization, freezing with Carbon Dioxide and ionisation with Zinc Sulphate Solution are the most useful.—J. M. H. McLeod, Pr., April 22/236.

An autogenous Strepto. Vaccine made from the excised tonsils of a patient was curative.—H. Barber, L. i./22,366.

Lupus leishmaniasis. A leishmaniasis of the skin resembling lupus vulgaris hitherto unclassified. History of case.—J. B. Christopherson, Jl. Trop. Med., June 1/23,203. *Antimony Tartrate intrav.*

Lymphangitis. Manganese Butyrate.

Lymphangitis, obstructive, treated by Potassium Iodide in conjunction with Potassium Acetate, the application of hot fomentations and complete rest. Several cases cleared up in a short time.—Sebastian L. Rodrigues, "The Antiseptic," (Madras), Dec./22.

Lymphadenoma.—Arsenic, "X" Rays. Coll. Manganese has been used.

Malaria.—Ammon. Picrate, Antim. Ox. injn. (?), Arsenicals, *Arsamin*, Arsenobenzol, Cinchona Febrifuge, Cinchonidine Sulph., Cinchonine Acid HCl., Cinchonine Injections, Eucalyptus Oil, Elix. Berberine, *Methylene Blue*, *Old English Fever Pdr.*, *Pulvis Quinin. Comp.*, *Quinin. Sulph.*, Quinidine, Quinine and Quinidine Periodides, Quinine base (for children, also in preference to a salt when there is hæmoglobinuria), Giemsa's injs., Quin. Hydrobrom. injec-

tions, Quin. HCl. internally in preference to Sulph., Salicin, Salicylates, Sodii Citras and Acetates and Tartrates *see* Sod. Cit., p. 33, 749, Steriloid Quinine and Quinidine, *Tylcalsin, Tyllithin, Tylmarin*, Urea.

Rusot (*q.v.*) *good results in Chronic Malarial Fever of children with hepatic derangement. Warburg's Tincture rarely used in India now.—Ghosh.*

Malarial Relapses.—Bold injection treatment with Quinine Acid Hydrochloride combined with Mist. Anticachexia 1 and 2. *See* Quin. Ac. HCl. p. 714 and p. 722.

Experience in the war and since, see p. 720.

For ***Antimalarial Measures in England*** *see* p. 723.

B.M.A. Special Clinical Meeting, Discussion, L. i./19,677. See also Annals of Tropical Med. and Parasitology, Vol. XII., Nos. 3 and 4. Abst., L. i./19,756.

Care and Treatment of Cases.—Sir Ronald Ross, L. i./19,780.

Subtertian malaria treated by Eusol. 60 Cc. maximum intravenous dose.—B.M.J. i./20,303.

Post malarial anæmia treated by Galyl.—J. Graham Forbes & R. F. Lunn, L. i./20,493.

Malaria recurrent well treated by N.A.B.—arguing by analogy that malarial fevers and syphilis are protozoal infections.—J. N. D'Esterre, L. ii./20,552.

Malaria, black water fever, dysentery, influenza, typhoid, typhus and sand fly fever in Macedonia in the war.—A. G. Phear, L. ii./20,56.

Neosalvarsan combined with Quinine in the treatment of chronic and relapsing malaria. Caused less frequent relapses, cases with anæmia and splenomegaly were markedly improved, tonic effect exerted and, in some cases in which "914" induced a relapse a few hours after injection, rapid recovery followed.—B.M.J. i./21,918.

Pregnancy complicated by malaria.—Quinine, see p. 721.

MALARIAL COMA.—Quinine-Urethane intravenously, *q.v.*

Malignant Pustule.—*See* **Anthrax.**

Malignant Tumours.—*See* **Cancer.**

Malta Fever.—*See* **Mediterranean Fever.**

Mammary Abscess.—*See* **Breast, Inflammation of.**

Mania.—Apomorphine, Atropine, Bromides, Cannabis Indica, Chloralamide, Chloral Hydras, Chloroform, Conine, Diacetyl and EthylMorphine, Digitalis, Gelsemina, Hyoscine salts, Hyoscyamine, Malourea, Morphine preps., Opium preps., Paraldehyde, Sedasprin, Syr. Pot. Brom. et Pilocarpin, Sulphonal, Thyroid Gland, Trional.

Marasmus.—Arsenical preps., Conf. Glyceroph. Co., etc. Elix. Hæmoglobin, *Emuls. Ol. Morrhuæ c. Lecithin*, Lecithin, Iron preps., *Mallaffin*, Meat preparations, *Milk and Glycerophosphates*, Marrubin, Omnevit, *Pavimol*, Thymus.

Infantile: Sod. Taurocholas and Glycocholas *q.v.*

Measles.—Aconite, and Pastil of, Æther Nit. Spt., Ammon. Acet. Liq. Ammon. Carb., Belladonna Tincture, Calc. Sulphid., *Cinnamon Powder for prophylaxis*, (German measles) Ipecacuanha, Nuclein inj., Potass. Tart. Acidus.

Ol. Eucalypt. all over the body: Carbolic Oil 10% to the tonsils and pharynx.

It was found possible to confer immunity by injecting the serum of a patient convalescent from measles—analogy with vaccination.—Leader, L. i./22,591. *See also* B.M.J.E. ii./21,36.

Diazo-reaction in urine in measles. Histidine is responsible for about 85% of the colour produced. In measles the output of it is increased.—G. Hunter, B.M.J. ii./22,751.

Aspirin, Phenacetin and Dover's Pdr. combined. Tablets are made.

Mediterranean Fever.—Intestinal Disinfectants, *e.g.*, Benzonaphthol, Salol, Hexamine, Trilactine, Vesalvine 'S' etc. Boil the milk. M. Melitensis Vaccine.

Dried Yeast for peripheral neuritis of.

Melancholia.—Bile Salts, Bromides, Brominol, Camphora, *Catha Milk and Glyceroph*, Coca and Cocaine, Cannabis and Cannabin Tannas, Damiana, Elixir Gentianæ Acidum, *Elix. and Emulsio Lecithin*, Musk, Nitroglycerin Tabellæ, Nux Vomica, *Ol. Elliott Caps.*, Opium Tinct., Phosphorus, Pil. Potentin Co., Pituitary Gld. Entire, *Syr. Glyceroph. Co.*, Syr. Neurotonique, Tabellæ Erythrol Nitrate, Valerianates.

Menière's Disease.—Acid. Salicylic., Bromides, Caffeine, Gelsemium Pelletierine.

Meningitis.—*Discover cause* and treat according—*e.g.* if C.S. Antimeningo. Serum, Belladonna, Calomel, *Hexamine* (?), Iodides, Opium, Veratrum. Lumbar puncture, Antiseptic Injections, Mercurial Injections. Colloidal Metals, *e.g.*, Platinum in some forms of.

Meningitis, Basic.—Iodoform Vaseline inunction to back of neck.

Menopause.—Ovarian Substance and Corpora Lutea desiccated.

Menorrhagia.—Acid. Sclerotic., Acid. Sulph. Dil., Amyl Nit., Beberinæ Sulphas, Bromides, *Brucea Sem.*, Calc. Chlorid., Cannabin, Cotarnine Phthalate, Digitalis, *Elixir Ergotæ cum Ferro*, Ergot, *Erigeron Oil*, Erodium Cicutarium, Ferro-Alumen, Hamamelis (see note *infra*), Hydrastis, Iron Persalts, *Lecithin Elix. and Emuls.*, *Monsel's Solution*, Mammary Gld., Ovar. Gld., Pituitary Gland Dry (entire gland), Plumbi Acetas, Sodii Citras, Thyroid, Viburnum, Zinc Ions.

For severe menorrhagia Tinct. Hamamelidis in small doses does no good, but 1 drachm every 2 hours up to 4 ounces in the period are effectual.—W.W.W.

Migraine.—See **Headache Nervous.**

Milk to increase flow.—Acid. Lactic., Galega (Goat's Rue), *Ext. Gossypii Pulv.*, Jaborandi, Malti Ext., Meat Extracts, Marrubin, Pineal Extract (?), Pituitary Extract (?), *q.v.*, *Potass Cit.*, Thyroid Gland.

During lactation, as soon as milk engorgement shows itself, give *Potassium Citrate*—this helps to make the thick stagnating milk more fluid, *e.g.*, Potassium Citrate 15 grains, Ammonium Carbonate 3 grains, Chloroform Water 2 drachms, water to one ounce. One ounce four-hourly. The Ammonium Carbonate assists in keeping the blood alkaline. The child does not object.—R. Larkin, B.M.J. i./17,765.

Milk, to arrest flow.—Agaricus albus and Agaricin.

Belladonna either internally or applied locally (*e.g.*, Plaster) or Glyc. Bellad. is very efficient. probably acting locally on the mammary gland as on the sweat gland.—H. W.

Drugs excreted by the milk which hence affect the child.—Anise Oil, Dill Oil, Garlic, Turpentine, Copaiba Oil (and probably all volatile oils), Sulphur, Rhubarb, Senna, Jalap, Scammony, Castor Oil, Opium, Iodine, Antimony, Arsenic, Bismuth, Iron, Lead, Mercury, Potassium Iodide. These must be given with care. Copaiba or Turpentine will make the milk so nasty that the child will not take it. The purgatives may cause diarrhœa in the child. Opium should not be given in large doses to the mother. On the other hand, Mercury, Arsenic and Potassium Iodide may be given to the child by being given to the mother.—H.W.

Moles.—Liquid air. Caustics. Liq. Sodii Ethylatis.

Morphine Habit.—Berberine, Camphor, Cocaina, Codeine in 'Withdrawal,' *Coll. Gold*, Dionin, Emetine, Heroin, Hyoscina, *Mist. Belladonnæ Xanthoxyli and Hyoscyami*, Nitroglycerin, Nux Vomica, Sodii Bicarb., Sodii Bromidum Sparteinæ Sulphas, Trional.

Mosquitoes, to ward off.—See **Bites and Stings.**

Mumps.—See **Parotitis.**

Muscular Rheumatism or **Myalgia.**—Actæa, Ammon. Chlorid., Aspriodine, Atropinæ inj. hypod., Elixir Calcii Chlorid., Calcii Lactat., Ibogaine, Iron Salts, Morphinæ inj., Pot. Iodid., Salicylates, Sedeff.

Anserine Mulls medicated, *Belladonnæ Glycerin and Linim.*, *Capsici Empl. and Linim.*, *Camphor Liniment and Compound*, *Clove Oil*, *Ether Spray*, *Iodi Linim.*, *Menthol*, Methysal Balm, *Veratrinæ Ung.*—See also LUMBAGO.

Myasthenia Gravis.—Lecithin, Electricity.

Myxœdema.—Arsenic, Iron Salts, Nitroglycerin, Pilocarpine, Spleen Substance, Strychnine preps., '*Three Gland*' *and* '*Four Gland*' *Elixir and Tablets*, Thyroid preps.

Sir J. Cantlie attributes puffiness in various parts of the body in women to the open chest clothing so much in vogue. He has had excellent results from Four Gland Tablets. Puffiness cured and depression removed.

Nasal Catarrh.—See **Catarrh, Nasal.**

Nævi.—*Acid Carbonic*, *Acid. Chromic.*, *Acid. Nitric.*, *Actual cautery and vaccination*, '*X*' *rays*, *Collodium*, *Sodii Ethylas*, *Zinci Chlorid. Iodid. and Nitras.* *Liquid Air.* Mesothorium Bromide. *High Frequency Current.*

Nephritis.—*Treat according to the cause.* Aconite, Alkalis, *Basham's Mixture*, Buchu, Copaiba, Digitalis with Caffeine, Erythrol Nitrate, Gokhru, Haustus Imperialis, Hordei Dec., Hydrastis, Iodo-Caffeine, Iodo-Theobromine, *Koumiss*, Pot. Nitris., Pot. Iod., Pulv. Potass. Nitrit. Co. (Brunton),

Salt free diet, Santali Oil, Scoparius, *Sod. Salicyl.*, Strophanthus, *Theobromine Aceto-Salicyl.*, Triticum Repens, Uva Ursi. *Saline Solution injected may prolong life.* B. Coli Vaccine (of pregnancy).

Alkaline Salts.—Acetates, Tartrates, Citrates and Bicarbonates of Sodium, Potassium and Ammonia probably act on the renal epithelium. The slight excess of saline constituents thus produced in the blood stimulates the renal epithelium to excrete them. They draw with them a certain amount of water and the flow is increased. *Cardiac Tonics.*—Digitalis acts directly on heart muscle and arteries and increases flow of urine by quickening flow of the blood through the kidney,—especially useful where blood pressure is low or the heart failing before resistance too high for it. *Caffeine, Theobromine and allied drugs.*—These stimulate both heart and renal cells. Theobromine-Sodium Salicylate is more potent than Caffeine. Where condition of the kidneys is the main cause begin with Alkaline Salts.—Herringham.

Nervous Debility, Nervousness.—Acid. Hydrobromic , Acid. Phosph. Dil., *Arsamin*, and other Arsenic preps., Asafetida, Atropine Methyl Bromide, Atropine Valerianate, Antiseptics, *e.g.*, Calomel, *Biscimiod*, Bromides, *Brominol*, Calcii Glycerophosphas (*et. cum Lact. Exsicc.*), Camphora, Cannabis, Indica. *Capsul Valerian Comp.*, Catha Milk and Glyceroph., Coca Wine, Droitwich Baths, Easton's Syrup, *Emuls. Ol. Morrh. c. Lecithin*, Ferri Glycerophosphas, Ferric Salts, Guttæ Castorei Co., Hæmoglobin Capsules, etc., Hypophosphites, Ibogaine, Ignatiæ Tinct., Lavand. Co. Tinct., Lecithin (Elix. and Emulsio.), Liquor Auri et Arsenii Bromidi, Liquor Auri et Hydrarg. Brom., *Liq. Antihystericus*, *Liq. Ferri Mang. Pept. c. Hæmoglobin*, *Liq. Iodo-Ferri Pept.*, Liq. Testicularis, Magisal, Marrubin, *Ol. Allii Essent.*, Ol. Morrhuæ, Omnevit, Ovarian Subs., *Pil. Potentin Co.*, Phosphorus, Quinine preps., Salicin, Sedasprin, *Syrup Kolæ Comp.*, Sodii Phosph., *Spt. Meliss. Comp.*, Strychnine, Sumbul, *Sirop Neurotonique*, Suprarenal Gland, *'Three Gland' and 'Four Gland' Elixir and Tablets*, *Theobromine-Lithium Benzoate*, Thyroid, Trilactine, *Urea Bromine*, Valerian preps., *Vanadates*, Veronal.

Speech Fright.—*See* **Stage Fright.**

Neuralgia, *Discover cause.*—Acetanilide, Aconite, Actæa, Æther (injected), Alcohol injections, Amidopyrin-Aspirin, Ammon. Carb., Ammon. Chlorid., Arsenic, Aspirin, Atropine Valerianate and Salicylate, Belladonna, Bromides, Butyl Chloral, Caffeine, Cannabis, Chloral-Hydras, Cinchonine, Cinchonidinæ Sulph., Colchicine,Conium and Coninæ Hydrobromid., *Elixir Antineuralgic*, *Elix. Caffeine*, *Elixir Gentian Acid.*, Exalgin, Gelsemium preps., Hyoscyamine, Iron Salts, Lecithin Elix. and Emuls., Liquor Bromo-Chloral Comp., *Magisal*, Methylene Blue, Monobromacetanilide, Neuralgic Pills, *Neuralgia Powders*, Nitroglycerin, Phenacetin, Phenazone, Phosphorus, *Pil, Butyl Chloral c. Camph. et Gelsem.*, Pil. Potentin Co., *Pulv. Morphin. Eff.*, Quinine preps., Quin. Urea Inj. (acute facial), Salicylates and Salol, Sedasprin, *Sedeff*, *Syr. Glyceroph. Co.*, Syr. Hypoph. Co., Syr. Pilocarpin. et Potass. Brom., *Tylcalsin*, *Tyllithin*, *Urea-Bromine.*

Æthyl Chlorid., *Aconiti Linim.*, *Aconitinæ Ung.*, *Belladonnæ Collodium et Tinct. Ætherea*, *Linim. and cum Chloroform*, *Chloral Hydras cum Camphor and cum Menthol*, *Chloroform*, Ung. Iodi Intinctum, *Menthol Linim.*, *Methysal Balm*, *Morphinæ Oleat.*, *Oleanodyne*, *Quinine Ionised*, Radium, Salicylic Ions, Thorium, *Veratrinæ Ung. All Anodyne Liniments.*

Neuralgias of the head and neck—dental, antral abscess, paroxysmal trigeminal neuralgia, supra-orbital, post-herpetic frontal neuralgia, migrainous, occipito-nuchal neuralgia and psychalgia considered.—Wilfred Harris, L. i./23,150.

Neuritis, *Discover Cause.*—Arsenical preps., Aspirin, Iodides, Mercurials, Salicylates, Sedatives—Nitroglycerin, Phenazone, Static Electricity, Interrupted current.

Hydrochloric Acid (g.v.) applied locally.

Multiple neuritis. External poisons, *e.g.*, CS_2 used for sticking rubber soles to boots, autotoxæmias, infections, cachectic conditions responsible for.—Wilfred Harris, L. ii./22,849.

Neuritis, Retrobulbar.—*Retinal Extract.*

Neurasthenia.—*See* **Nervous Debility.**

Night Sweats.—Acid. Camphoric., Atropine and inj. hypod., Atropine Methyl Bromide, Belladonna, Coto and Cotoin, Guaiacol Carb., Elix. Quinindine, Hyoscinæ Hydrobrom., Iron Salts, Picrotoxin, Quinine preps., Strychnine.

Nipples, Fissures of, and Sore.—*See* **Fissures of Nipples**
Nits.—*See* **Parasites, Animal.**
Nocturnal Emissions.—*See* **Incontinence.**
Nose Bleeding.—*See* **Epistaxis.**
Nymphomania and Satyriasis.—Bromides, Camphor, Conium, Hyoscine.
Nystagmus.—Formic Acid.
Obesity.—Alkalis and Alkaline Carbonates, *Belladonna*, Bromides, Fucus, Iodinol, *Iodoprotein Tabs.*, Iodum, Potassii Iodidum, Saccharin instead of sugar, Sassafras Ol. (?), Sodii Mag. Sulph. Efferves., Thyroid. Aperient Waters.
Œdema.—*Calcii Lactas* (of feet), *Calcii Chlorid.*, Theophylline Sodium Acetate.
Allium Scales, *Cataplasm Salicyl. Co.*, *Antiphlogistine*, *Lin. Pot. Iodid. cum Sapone*, Mag. Sulph. Solution, Perfumed Formosyls, *Ung. Hydrarg. Co.* (of Ankles.)
Œdema, Angioneurotic.—Post-Pit. gland *per os* and inj., Thyroid, B. Coli Vaccine autogenous.
Ophthalmia.—*See* **Conjunctivitis.**
Ophthalmia Tarsi. (*Local use.*)—*Acid. Boric. Lotio and Ung.*, *Glycerini*, *Plumbi Subacetatis Ung.*, *Copper Sulphate*, *Hydrarg. Oxid. Flav. Ung.*, *Iodoform Ung.*, *Sphagnol.*
Optic Atrophy, various types of. One group is that associated with toxic neuritis (commonly called retrobulbar), in which damage is done directly to the neurone itself. A large group of substances gives rise to the disease called 'toxic amblyopia': Methyl Alcohol, Tobacco, Ethyl Alcohol, Quinine, Lead, Carbon Bisulphide and Arylarsonates.—R. E. Wright, B.M.J. i./23,806.
Orchitis.—Acetanilide, Aconite, Antimonials, *Iodoprotein Tabs.*, Pot. Iod., Saline aperients.
Belladonna Glyc. et Ung., *Guaiacol*, *Iodi Tinct.*, *Oleosa and Ung.*, Mag. Sulph. Solution, *Mercurial Plaster*, Mercurochrome (?).
Oriental Sore.—Carbon Dioxide Snow. Emetine Injection, Organic Antimony and Arsenic, Phosphorated Oil (Castellani).
Osteomalacia.—Parathyroid, Omnevit.
Otitis and Otorrhœa.—Aconite, Antimonials, *Aurinaria*, *Glucose Solution, swab with*, Iodides, Saline aperients, *Pneumococcal Vaccine.*
Acid. Chromic, *Acid. Tannic*, *Alum Insuffl.*, *Argenti Nitras and Bismuth Insuffl.*, Bromphenobis, *Calomel*, *Carbonis Det. Liq.*, *Cyllin. Ferri Perchlor.* Formosyl, *Glycerin*, Hyd. Perox., *Ichthyol. Iodates*, *Iodi Tinct.*, *Iodoform Wool, and Insuffl.*, *Naphthol*, *Perfumed Formosyls* (*diluted*), *Pot. Permang.*, *Resorcin*, *Salicylic Acid*, *Thymol*, *Turpentine*, Xeroform, *Zinc Chloride.*
Chronic ear suppuration treated by B.I.P.P.—F. Stoker, L. ii./19,200.
Ovarian Pain.—Ammonii Chlorid., Bromides, Castor. Tinct., Corp. Lut., Mammary Subs. (?), Morphine preps., Ovarian Subs), Phenazonum, Sumbul Tinct.
Oxaluria.—Eliminate from diet vegetables containing most Oxalate, *viz.*, rhubarb, spinach and tea, at the same time attempt to influence proportions of the bases present in the urine by cutting off foods rich in Calcium such as milk and eggs, and by prescribing such as are rich in Magnesium and at the same time poor in Oxalic Acid, such as peas, beans and coffee, and Oxalate-free foods, as all kinds of meat.—A. E. Garrod.
Ozæna.—(*Local use.*)—*Acid. Carbolic. Buginarium*, *Alum*, *Creosoti Vapor*, *Cupri Sulph. Bugin.*, Formosyl, Glucose Solution as swab, *Hyd. Perox.* (and Borated), *Iodoformi Ung.*, Formosyl, *Menthol spray and pigment*, Nebula Formaldehydi, *Perfumed Formosyls* (*diluted*), *Potass. Permang.*, *Sodii Chlorinat. Liq.*, *Sodii Chlorid.*, *Thymaglycine*, *Thymol Lotio*, *Zinci Sulphocarb.*, *Zinc Chlor. et Sulphas*, Ozæna Vaccine.
Paraffin, high melting, injected into nasal septum.
Pancreatitis.—Pancreatin Stearettes.
Paralysis.—Iron Salts, Nuclein Injn., Parathyroid preps., Post-Pit. preps. Strychnine.
Paralysis Bulbar.—Sodium, Lithium, Salicylic, or Iodine Ions.
Paralytic Distension of Intestines.—*Pituitary Ext. Liq.* (*posterior lobe*).
Paralysis, Hemiplegia.—Arsenicals, Ergota, Iron Salts, Mercurialised Serum, Nux Vomica, Phosphorus, Physostigma.
Paralysis, Paraplegia.—*Arsenic Comps. Organic*, Ergota, Mercurialised Serum, Phosphorus, Physostigma, Strychnine.

General paralysis treated by malaria. The principle is that remissions in chronic disease may occur after an attack of acute specific fever. Many methods of producing artificial fever have been tried, *e.g.*, with (1) chemical substances, *e.g.*, Sodium Nucleinate, (2) toxalbumins, *e.g.*, Tuberculin, staphylococci, (3) acute disease. The latter is the most efficient. In this instance subcutaneous injections are given of 2 to 4 Cc. of blood from the vein of a patient suffering from benign tertian malaria. The malaria is cured by quinine. Finally, Neo-Salvarsan given intravenously—symptoms of general paralysis disappear to a great extent.—W. L. Templeton, B.M.J. i./23,895; Prof. W. Yorke and J. W. S. Macfie have also reported on.

Parasites, Animal, on Skin. (*Local use.*)—Acetum Cevadillæ, Anserine Mulls Medicated, *Benzol*, Chloroform, Cresol Soap (S. M. Copeman), Formosyl and Perfd., *Hydrarg. Ammon. Ung.*, *Hydrarg. Oleat.*, Lefroy's Petroleum Emulsion, *Hydrarg. Perchlorid*, *Lotio and Ung.*, *Lotio Hydrarg. Acetic*, Lotio Parasit., N.C.I., *Naphthalin Ung.*, *Ol. Cajuput*, *Ol. Sassafras*, Paraffin Liq. (friction with), Phenoloid Disinfectant—dil., *Pyrethri Flor. Tinct.*, Stanni Oleas, *Staphisag. Ol. or Ung.*, *Sulphur Baths*, *Lotion, and Ung.*, *Sulphurated Lime Lotion*, Thymol, Westoran, Westropol.

Clothes Louse.—Soak undervests in 1% Naphthalene and Sulphur in Benzol or Petrol. *See* Naphthalene. Immerse in *gasoline*, *petrol or paraffin*, or scald the clothes.—From a pamphlet by B. F. Cummings, issued by the British Museum (Natural History) Trustees. 30% *Borax* in powdered *black hellebore root* stated to prevent re-infection. Lice are *killed* by Cresol Powder 3% (Formalin is *inactive*), Sulphurous Acid, CS_2 and CCl_4. SO_2 from burning Sulphur in a stove best for rooms. *Westoran* and *Westropol* have been advocated.

N.C.I. (*q.v.*) has been much used, also *Vermijelli.*

Para-dichlor.-Benzol is active, but causes burns on the skin. Clove oil also, but too expensive.

The best *powder* is Naphthaline. Menthol is preferable in odor. It repels mosquitoes and fleas as well. For ***Bed Bugs*** Kerosene is best (Iodoform has no deleterious action on these). Pyrethrum is more powerful on bed bugs than on lice.—A. Castellani and T. W. Jackson, L. i./16,39.

Cytisine from Gorse.—Compared with Naphthaline, Cresylic Acid and others. It might be toxic to impregnate garments. Iodoform does not improve effect of Naphthaline. An emulsion of equal parts of common Cresol and Soap used in 5% solution in warm water is best, but might irritate the skin.—A. Bacot, B.M.J. ii./16,447. See also B.M.J. ii./19,603.

An ***exposure at 60° C. for 10 minutes*** is lethal to lice and their eggs. *Wax Thermometer* employed. Ampoules containing wax with this and somewhat higher melting point and glass beads would be useful in hot air sterilising chambers.—E. Emrys-Roberts, B.M.J. i./18,509.

See also **Pediculosis Capitis** *infra.*

Parasites, Intestinal—*See* **Worms.**

Parasites, Vegetable, on Skin. (*Local use.*)—Acet. Cevadillæ, *Acid Carbolic*, *Acid. Chrysophanic Ung.*, *Acid. Sulphuros.*, Argent Oleas, Cupri Oleat. (*for favus*), *Formol.* Formosyl. *Hydrarg. Oleat.*, Hyd. Perox., Lotio Parasiticidus, Perfumed Formosyls, Petroleum (for favus), *Phosphor. Ol.*, *Picrotoxin Pigment*, *Pyrogallol*, *Sassafras*, *Sodii Hyposulph.*, *Thymol*, *Ung. Thorii Oleat.*

Paratyphoid, *see* TYPHOID.

Paresis.—Hydrarg. Perchlor. has been used.

Parotitis (Mumps).—Aperients, Saline, Iodides, Phenazone, Salicylates. *Glycerin of Belladonna to neck*, *Iodine*, Methysal Balm.

Pellagra. *See Vol. II.*

Pediculosis Capitis (Lousiness).—*See also* Parasites, Animal, *antea.*

Head Lice.—Use 2% Phenol. Kills nits also. If necessary cut the hair short and apply Kerosene, Petrol, Paraffin, Turpentine (*cf.* Sapo Olei Tereb.), Benzene or Xylol—not to be allowed to remain long on the scalp.—B. F. Cummings (British Museum).

Acetic Acid 10% dissolves the substance by which the nit is attached to the hair. Kerosene and Olive Oil equal parts left on for 24 hours and then wash off. 5% Mercuric Oleate in ether is effective.—P. S. Lelean.

For female children where the hair is long, thoroughly soak the hair in 1 in 40 Phenol Solution. It is not desirable for children under five. Patient

lies on a bed with head over the edge,—the hair hangs over a basin. Sluicing with the Solution is continued for ten minutes, particularly over the ears. The hair is then wrapped in a flannel like a turban.—A. Whitfield.

Sodium Taurocholate (*q.v.*) Emulsion has been used.

Pediculi,—to kill in room, *i.e.*, after infection,—Nitrous fumes or Sulphuric. Acid as suggested under Malaria, Vol. II.

Methods of killing lice and nits by heat.—W. W. O. Beveridge, L. ii./20,681. Light Wood Tar Oils for destruction of Lice on hair-clad areas.—A. Bacot, B.M.J. ii./21,853. Lice destruction on hair. Necessity for preparation to be non-inflammable and non-injurious to the skin and hair and easily removed afterwards.—E. S. Burt Hamilton, B.M.J. ii./21,968.

Pericarditis.—Aconite, Caffeine, Digitalis, Fæxin, Lotio Quassiæ, Mercury preps., Nuclein, Opiates and Musk (to relieve pain), Potass. and Sodii Iodid., Salicylates.

Belladonna Emp. and Liniment, Leeches, Ice, Blisters.

Peritonitis.—Acetanilide, Aconite, *Colloidal Metals*, Digitalis, Hydrarg. Subchlorid. cum Opio, Hyoscyamus, Opium and Belladonna, Phenazone, Tuberculin, Veratrum Viride. For collapse Curschman's Sterules, Caffeine Sod. Salicyl, etc. Vaccines.

Turpentine or Belladonna, Stupes or Poppy-head fomentations. For Pelvic,—Collargol Suppository.

In diffuse septic peritonitis there is fatal absorption through the thoracic duct. This explains why good results follow the administration of Opium. —W. A. Costain, L. i./23,1288.

Perspiration, Excessive.—Acid. Agaric., Acid. Phosph. Dil., Acid. Sulph. Aromat., Atropine and inj. hypod., Atropine Methyl Bromide, Belladonna, Ergot, Pilocarpine, Picrotoxin, Quinine preps.

Ac. Chromic (of feet), *Diachyli Ung.*, *Emol*, Formosyl, *Kaolin*, *Naphthol sol. in Alc. and Glyc.*, *Tannin.*, *Zinci Oleat*, *Pulv. and cum Thymol.*, *Zn. Oxid.*, *Zinc Carb.*, *Zinc Borate*, *Pasta Zinci et Amyl.*, '*X*' Rays (see Radiology).

Equal parts of Lead Plaster and Linseed Oil applied as a plaster under a bandage and left on 48 hours.—W. H. Robinson, B.M.J. i./21,216.

Perspiration, Fetid.—Mineral Acid and Vegetable Acids (Calcii Sulphas as in Contrexeville Water), Sulphur (of feet), and Tonics.

Acid. Carbol. Lotio and Ung., *Ac. Salicyl. Pulv. cum Talco*, *Alum. Acet. Lotio*, *Atropine Lin.*, *Borax*, *Diachyli Ung.*, Formosyl, *Glyc. Plumb. Subac. Ung.*, Iodates, Ung. Sulph. Zinc. et Kaolin (of feet), *Zinci Oleat. cum Thymol.*

Pertussis—*See* **Whooping Cough.**

Pharyngitis.—*See* Throat, Inflammation.

Phlebitis.—Warm compresses and rest the limb with it raised.

Phosphaturia.—Acid Sodium Phosphate and general tonic treatment.

Phthisis.—Acid. Camphoric., Acid. Cinnamic and Salts, Acid. Coumaricum, Acid Fluoric and Ammonium Fluoride inhalations, Acid. Hypophosph: and Hypophosphites, Acid. Lactic. and Lactates, Acid. Malic., Acid Sulphuros, Allium preparations, Arsenic (and organic compounds, *e.g.*, Arsamin), *Asprio-dine*, Atropine (for night sweats), Benzoates, '*Brass Paste*' (local), Cacodylates, Calcii Iodid. Elixir, '*Calcium*' *Colloidal*, *Cerium Salts*, *Cholesterin*, Cinnaldehyde Capsules, Codeine (for cough), Creosoti Elixir and Comps., Crotalin, *Durant's Injection*, Elix. Hæmoglobin c. Lecithin, Emuls. Ol. Morrhuæ c. Lecithin, Emulsio Paraff. c. Pancreatin, Emulsio Petrolei, Eusol, Ferri Perchlor., Formalin Inhalant, Glycerophosphates, Guaiacol, Camph., Carb., Cinnam., or Phosph., Guaiacol-Salol, Hyd. Succinid., Ichthyol Capsules, *Inj. Cacodyl. Co.*, Intramine (?), Iodof. and Creosote Oil, Iodof. and Benz. Chloride, Iodof. Glyc. Inj. (Abscess), Iodine, 'Nascent,' Iodoform in Ether Inj. intrav. (phthisis), Iodof. and Menthol Inj., Liq. Iodi Fort (sinuses), Iodi Tinct. (tonic), *Lecithin*, *Liq. Ferri Mang. Pept. c. Hæmoglobin*, Iron Salts, Maltolivine, Marrubin, *Mist. Creosoti Co.*, *Mist. Guaiacol*, *c. Quin.*, Mist. Sodii Iodid. Co., Muthu's Inhalant, Naphthol-Camphor (inserted in joints), *N. Horse Serum*, Neb. Formalin, Ol. Morrhuæ c. Creosoto, Ol. Olivæ cum Acid. Oleic, Oxygen, Palladium Chloride, Pancreatin, Pavimol, Pepsin, *Periodides of Codeine*, *Quinindine*, *etc.*, Phenol Sodii Sulpho-Ricinas, Pil. Niemeyer (fever), Piscidia, Pot. Bichrom., Quinine preps., *Radium*, Resorcin (Laryngeal), Salicin, Sirop Neurotonique, Sodii Cresotinas, *Sodii Fluoridum*, Sod. Hypophosp., Sod. Morrhuate Injected, Spleen Substance, Strych. Cacodylas, Sugar Feeding, Suprarenal Gland, *Syr. Iodo-Tannic*, *Tiodine*, *Tuberculin Ointment*, *Philip's by inunction*, Tuberculins,

Trilactine (intestinal), Trypsin, *Tylmarin* and Comps., Oxygen inj. (peritonitis), Ung. Acid. Salicyl., Terebinth., *Urea*, *Vanadates*, Vap.-Creosot Co., Vap. Guaiacol Co., Verbasc. Thapsus, Yeast. For *Hæmorrhage* of, Amyl Nitrite Sterules.

Artificial Pneumo-thorax, *'Remineralisation'* with Mg Salts.

Aural tuberculosis in infants. Iodine Tincture weak, then strong, applied. On no account syringe the ear—Hydrogen Peroxide is bad.—W. Stuart-Low, Pr., July 22/57.

Inflation with oxygen—worthy of further trial.—R. Purves and E. J. Bilcliffe, B.M.J. i./24,906.

Tuberculous Glands.—Acriflavine, *Radium*, *Guaiacol*. *See also* Phthisis.

Tuberculous Joints.—Zinc Chlor. Solution, Iodised Phenol.

Diagnosis.—*See* Tests, p. 928.

Phytosis of the feet. Induce desquamation. Whitfield's Ointment.—M. B. Hutchings, Jl. Trop. Med., Jun. 1/23,208.

Piles.—*See* **Hæmorrhoids.**

Pityriasis.—*Acid. Chrysophanic Ung.*, *Boracis*, *Glyc. and Lotio*, *Chaulmoogræ Ung.*, *Glyc. Pb. Subac. Ung.* Hyd. Oleas, *Huile de Cade*, *Lotio Resorcini*, *Picis Ung.*, Perfumed Formosyls.

Plague.—Serum and Vaccine.

Bubonic plague treated with Neo-salvarsan and Pituitary injection.—R. Mansoor, B.M.J. ii./22,127,190.

Pleurisy.—Aconite, Ammon. Acet., Antimony, Apocynum, Bryonia, *Colloidal Metals*, Morphine preps., Pot. Iodid., Quinine preps., Sodii Salicylas, Sterilised Paraffin, Veratrum.

Blisters, *Cataplasm*, *Salicylic. Co.*, Iodates by injection for empyema, Salicylic Ions, *Ung. Hydrarg.*

A post-graduate lecture by Sir W. Hale-White, Pr., July, 1921.

Pleuritic Effusion (Recurrent).—Intra-pleural Injection of Formalised Glycerin has been practised. *See* p. 135. Calc. Chlor. *per os.*

Pleurodynia.—*See* **Myalgia.**

Pneumonia.—Aconite, Adrenalin, Ammon. Carb., Cit. and Chlor., Aspirin, Belladonna, Caffeine, Caff. Sod. Salicyl, *Calc. Chlor.*, *Camph. Sterules*, Chloral and Digitalis (and with Nitroglycerin), *Colloidal Metals*, Creosot. Carb., *Mist. Creosoti et Potass. Iodid.*, Digitalis, *Ethyl Hydrocupreine* ***base***, *Ferri Perchlor.*, Guaiacol, Hydrogen Peroxide intravenously, Hyoscyamus, Liq. Fe. Acet., *Nuclein inj.*, Ol. Allii Essent., Phenacetin, Phenazone, Pilocarpine, Pot. Nit. and Salt-free diet, *Quinine preps.*, Salicin, Salines, Sod. Cit. (30 to 40 grains every 2 hours), *Serum*, *Saline transfusion*, Strophanth. Strychnine.

Vaccine, *Cataplasm Salicyl. Co.*, *Ice Bags* (so placed as to include the inflamed area), *Leeches*, *Oxygen* (*and with Alcohol*). *Blood Transfusion.*

A case pulled through by shouting to patient to keep breathing and free use of Atropine, with Vaccine.

A good leucocytosis in early stage is favourable. When defective the old remedy—a large *blister*, may be valuable, *e.g.*, *Liquor Epispast.* freely painted on the back. Febrifuge drugs will only mask symptoms.—Sir J. Barr, B.M.J. i./14,69.

Pot. Iod. 4 grains, Pot. Cit. 10 grains, Liq. Ammon. Cit. ½ oz., Water to one ounce—every four hours. Dr. Crowly's treatment for pneumonia.—Facile princeps.—J. A. W. Pareira.

Broncho-pneumonia treated by Iodine intravenously. 20 to 30 minims of Iodine Tincture diluted with 9 Cc. of N. Saline. Success.—D. M. Baillie, L. i./19,423.

Patients will stand large doses of Quinine.—S. S. Cohen, Pres., Apl./20,167.

A medical man on his own attack. He prescribed his own treatment. Lay on his back with head raised enough for the mouth to be above the bed clothes. Breathing: slow and shallow, and no moving. Diet: extremely spare—drank a lot of water; plenty of fresh air; Herpes appeared on the lower lip (is there connexion between herpes and pneumonia?) Gaultheria Liniment good for pains. Morning rises of temperature experienced. Happy termination.—L. i./22,721.

Alcohol (whisky and soda) used freely. Digitalis *q.s.* to reduce pulse rate. If temp. was 104° F., 1 or 2 grains of Antifebrin added. A high temp. has an exhausting effect on the heart. Opium given to soothe cough. The prescription was therefore: Quinine 1 grain, Digitalis Powder ½ or ¼ grain, Antifebrin 1 or 2 grains, Opium Powder ¼ grain: in powder or pill—one every 2, 3 or 4 hours.—J. T. Maclachlan, B.M.J. i./23,897. *See also* INFLUENZA

Poisons.—See **Antidotes** under each heading in the text, and **Emetics**, also special Chapter at end.

Polio-encephalitis, Acute.—A form of it epidemic in certain large towns in England and France was thought to be due to *B. Botulinus.*—F. G. Crookshank.

Poliomyelitis has been referred to insect bites.

Acute poliomyelitis. Immune serum 10 Cc. intraspinally daily for several days from one who has passed through an attack and who is free from syphilis taint. *Hexamine* is usually given (10 grains every 4 hours) in acute stage but doubtful if of much value.—E. Farquhar Buzzard, B.M.J. ii./21,225.

Polypi. (*Local use.*)—*Hydrogen Peroxide* (and Borated)—styptics.

Aural Polypi—discussion on removal of.—J. S. Fraser and S. Young, B.M.J. ii./22,467. As a matter of routine Zinc Chloride and Alcohol drops instilled for a week before removal of a polypus, when bathed in pus.—Sir J. Dundas Grant, *ibid.*, p. 468.

Polyuria.—To reduce output—pituitary. *See also* INCONTINENCE.

Portwine Stains.—Radium.

Post-Partum Hæmorrhage.—*See* **Hæmorrhage.**

Pregnancy.—*See* **Uterus, to contract.**

Pregnancy, Vomiting of.—Aconite, *Adrenalin*, Argent. Nit., Arsenic, Belladonna, Bismuth and Pancreatin, Cerii Oxalas, Chloral, Chloroform, Cocaine, Corp. Lutea, Creosote, Hydrocyanic Acid. Iodides, Iodi Tinct. m.i. in ounce Aq. every two hours. Ipecac., Menthol, Morphine preps., Nux Vomica, Pepsin, Phenazone, Pot. Permang., Quinine preps., Sedeff, Spt. Nucis Juglandis.

To increase elimination of toxic degradation products.—Calomel with Sodium Bicarbonate.

Glucose injections useful.—V. J. Harding and B. P. Watson, L.ii./22,649.

Prickly Heat.—Hyd. Perchlor. Lotion (*q.v.*) made with Dilute Hydrochloric Acid.

Prolapsus Uteri.—Quinine injected.

Prostration.—Amyl Nitrite Sterules, Catha and Coca preps., Oxygen Inhalation, Stimulants. For rectal Injections see p. 414 *et seq.*

Prurigo.—Arsenic, Bromides, Cantharides, Iron Salts, Pilocarpine, Quinine, Sodii Carb., Trilactine.

Ac. Carbol. Lotio and Ung., Alc. Isopropyl, *Borax*, *Cocaina*, *Ichthyol*, Iodine Colloidal, *Iodof. Ung.*, *Liq. Ammon. Dilut.*, *Liq. Hyd. Perchlor.*, *Liq. Pb. Subac. Dil.*, *Pilocarpine*, *Staphisagria*, *Sulphur Ung.*, *Tar*, *Ung. Rusci. Co.*, *Ung. Sulph. cum Hydrarg.*, Anderson's Ointment.

Pruritus Ani, Vulvæ, &c.—*Acid Carbolic. Lotio and Ung.*, Acid. Picric Lotio, *Acid. Salicylic. Ung.*, *Acid Sulphuros. Lotio*, *Alkalis*, Aloes, *Alum Lotion*, *Anderson's Ointment*, *Argent. Nit. in Sp. Æther Nit.*, *Bismuth*, Ca. Lact., *Calomel dusted on*, *Carbolic and Cocaine Lotion*, *Carb. Deterg. Liq. Lotio. 2%*, *Chloretone*, *Chloroformi Ung.*, *Cocain. Ung.*, *Conii Ung.*, Formosyl, *Gallæ cum Opio Ung.*, *Glyc. Plumbi Subac. Ung.*, *Hyd. Oleat et cum Morphina*, *Hyd. Subchlor. Ung.*, *Hydrastis Liquid Extract and Hamamelis injected*, Ichthyol Suppos., *Lotio Nigra*, *Mentholeate*, *Menthol et Boracis Lotio.*, *Naphthalin Ung. and Suppos.*, *Orthoform*, *Pot. Cyanid. Lotio.*, Sod. Salicyl., Sod. Thiosulph., Tampons var., *Tannin*, Tinct. Cannabis, *Ung. Acid. Boric.*, *Ung. Rusci Co.*, *Uranii Oleas*, *Radium.*

Psoriasis.—Arsenic, Harrogate Water, Hydrar. Iodid. Viride, Iron Salts, Morrhuæ Ol.; Quinine, Sulphur, Thyroid (Standardised), *Trilactine.*

Acid. Carbolic, *Acid. Chrysophanic*, *Acid. Pyrogall.*, *Acid. Salicyl.*, Anserine Mulls, Argent. Oleas, *Betulæ Pyrolig. Ol.*, Carbonic Snow, Cocaine Ung., *Carbonis Deterg. Liq. Lotio*, *Formosyl*, *Huile de Cade*, *Naphthol Picis Ung.*, *Pot. Sulph.*, *Rusci Pyrolig. Ol.*, Sodii Carb., *Sulphides (in baths)*, *Sulph. Hypochlor. Ung.*, Thorii Oleat Ung., *Thymol Iodide*, Thymus Ext. intram., Ung. Iodi Intinctum, *Ung. Rusci Co.*, Vaselinum Creosoti, Alkaline Baths.

Ammoniated Mercury 1 dr., Liquor Picis Carb. ½ ounce, Paraffin Ointment B.P. 6 ounces well rubbed in with a piece of flannel. If it fails, try Chrysarobin Ointment avoiding face, hands and scalp and stop treatment if Chrysarobin erythema appears on any part.—H. G. Adamson, L. i./17,223.

Acute rapidly spreading psoriasis treated with Fowler's Solution *per os*, sulphur bath and sulphur 2% in Salicylic Vaseline to the scalp and 1% to the body.—E. Fleming Griffin, B.M.J. ii./21,41.

Psoriasis of very long standing greatly benefited by autogenous vaccine (Staph. alb.) and thyroid.—S. E. Denyer, B.M.J. ii./22,32.

Baths containing an emulsion of Oil of Cade and Chrysarobin used in extensive cases of psoriasis as an alternative to their application as ointments.—R. Sabouraud, per L. i./23,1318.

Ptomaine poisons.—Kaolin, Trilactine Milk preps. *See also* Antidotes to Poisons at end, and Ptomaines, *Vol. II.*

Ptyalism.—*See* **Salivation.**

Puerperal Fever.—Acid. Boric, Acriflavine Injection, Antifebrin, Antipyrine, Anti-Strepto. Serum, Eusol intrav., Ferri Perchlorid., Jaborandi, Nitro-glycerin, *Nucleinic Acid*, Opium, Peptone intrav., Pilocarpine, Pot. Brom. combined with Belladonna, Quinine (2 grains every four hours).—V. J. Glover, L. i./17,352). *Streptoco. Vaccine*, Terebinth. Ol., Saline transfusion, Stimulants.

Vaginal Injections of Sal Alembroth, or Mercuric Iodide Solution, or of Cyllin, Irrigation with Iniectio Iodi., C.H.W.

Swabbing with Strong Iodine Solution and giving large doses of Liquor Ferri Perchlor., to increase the general resistance, better than attempts to combat the infection itself.—Amand Bouth.

Give a quickly acting aperient, Croton Oil (or Oleum Elliott—W. H. M.) Saline injection, Morphine, Thyroid (30 to 40 grains), Nitroglycerin subcutaneously, Veratrum Viride, Pilocarpine, Oxygen.—C. E. Punslow.

Acid Sulphuric dil. 25 to 35 minim doses in puerperal infection (also for boils, carbuncles, etc.), in all labours whether with manipulations or surgical interference or not.—J. L. Moir.

Swabbing out uterus with Iodine, then douche, Strepto. Serum and subseq. Quinine intrav.—B.M.J.E. i./24,68.

Purgatives.—*See* **Constipation. Purgatives, Hypodermic.**—Aloin, Apocodeine, Colocynthin (may be emetic), Physostigmine.

Purpura.—Calcii Chlorid., Ergot, Iron Salts, Phosphorus, Quinine preps,. Oleum. Tereb.

Purpura Hæmorrhagica.—Blood Transfusion.

Pyæmia.—Autogenous Vaccine.

Pyelitis.—Benzoates, Collinsonia, Erigeron Oil, Hexamine Camphorate, Mercurochrome, Colloidal Silver, Vaccine.

Fluid intake restricted, not more than 300 Cc. daily from the 2nd to the 4th day. 1 Gm. Urotropine and 1 Gm. Sodium Salicylate with a little phosphoric Acid 3 times a day. Hot air baths twice a day to promote sweating. From the 5th to the 7th day drugs discontinued and the system flushed with large quantities of water.—Daniel, per Clin. Jl., June 27/23,310.

Pyorrhœa Alveolaris.—Vaccines.

Argyrol, Colloidal Silver hypod. *Antiseptic mouth washes, e.g.* Lotio Acidi Citrici et Phenolis, *Eusol.*

Emetine HCl. Solution ½% applied locally and injected. Cremor Magnesiæ, Formosyl T. Paste. *Vide* Emetine and Pigmentum Ipecac. et Arsen.

Zinc Ionisation.

L. Williams decries the fierce and fantastic fashion of wholesale teeth extraction for 'pyorrhœa' and quasi-pyorrhœa—Vitamins are necessary.—B.M.J. i./23,1012.

Pyrosis.—Acid. Hydrocyanic., Acid. HCl. Dil., Acid. Nit. Dil., Acid. Sulphuros., Atropine methyl-bromide, Bismuth preps., Carbo Ligni, Cerii Oxalas, Cremor Magnesiæ, Magnesia, Sod. Bic., Sodii Sulphocarb.

Quinsy.—*See* **Throat Inflammation.**

Rabies.—*See* **Hydrophobia.**

Rat-bite Fever.—Arsenobenzol.

Rectum and Colon Ulceration. *See* **Colitis.**

Rectum, Prolapse of.—Alcohol Injection *vide* Alcohol Refs.

Remittent Fever.—*See* **Malaria.**

Restoratives.—*See* **Debility.**

Rheumatism, Acute.—*Acid. Phosphoric*, Acetanilide, Aconite, Actæa, Aspirin, Aspriodine, Benzoates, Caffeine-Chloral. *Cocaine Ionisation.* Colchicum, Fæxin, Ferri Perchlor., Guaiacum, Lemon or Lime Juice, Lithion, Magisal, Opium, Ozonic Ether, Phenacetin, Phenazonum, Phenyl Aspriodine, Phenocoll, Pot. Acet., Bicarb. Cit. or Nit., Quinine preps., Salicylates, Salol, Sedasprin, Sod. Bicarb., Sod. Sesquiphosph., *Tylcalsin per os and Intrav., Tyllithin, Tylmarin*, Tylnatrin *per os and intrav.*, Veratrum.

Methysal Balm. Strepto. Vaccine. Thymaglycin as Mouth Wash, prophylactic.

Salicin equiv. to 43% of Salicylic Acid has to be given in dose double that of Sodium Salicylate. 20 or 30 grains should be given every hour or two hours until one ounce has been taken and then in smaller doses if required. Sodium Salicylate is the most effectual body both *in vivo* and *in vitro*.—Ralph Stockman. *See also* Absts. under Sodium Salicylate, Aceto-Salicylic Acid, Saligenin, Salol, etc.

B. Coli Vaccine intravenously in recent arthritis.

Rheumatism Chronic.—*Discover cause.* Actæa, Antim. Sulphurat., Arsenic, Aspirin, Aspriodine, Biciniod, Caffein Salicyl., Cinchonidinæ Salicylas, Colchicum, Conf. Guaiaci Comp., Ethyl Iodid., and Salicyl., Colloidal Metals, Ferri Iodid. Syr., Ferri Salicylas, Formates, Gaultheriæ Oleum, Gelsemium, Piperazine, Quinine Periodide, Iodoprotein Tabs., Lithii Hippuras, Lithion-Magisal, Manaca, Methylene Blue, Ol. Succini, Pelletierina, *Phenoquin*, Phytolacca, Pilocarpina, Piperazin, Benz. and Glyceroph., Podophyllin, Pot. Iodid. et cum Quinina, Quinin. Hydriodid., Radio-active Waters, *Radium*, *Emanation Inhalation*, Rhus, Sodii Boro-Salicylas, Sodii Formas, Sulphur, Trilactine, *Tylcalsin*, *Tyllithin*, Xanthoxylum.

Alcoolat de Fioraventi, Amysal, *Atropinæ Linim.*, *Bellad. Linim. and Linim. Co.*, *Belladonnæ Chloroformum and Tinct. Ætherea*, *Betol*, *Camph. Co. Linim*, *Capsici. Emp. and Linim.*, *Chloral cum Camphor.*, *Caffein and Sodium Salicylate injected*, *Croton Oil Lin.*, Ethyl Chloride Spray, *Eucalyptus Oil*, *Glycopasta Aconiti et Bellad.*, *Iodine*, Cocaine Solution and Chloroform Ionised, Lin. Mentho! Comp., *Lithium Iodide Ionised*, Mag. Sulph. inject., Methysal Balm, Methyl Salicyl. *and Plaster* and Ung., *Ol. Succini*, *Potassii Lactas*, *Sal. Marin. Artif.*, *Sassaf.*, *Oil Sod. Salicyl*, *c. Sod. Iodid. intrav.*, Ung. Iodi Intinct., Ung., Acidi Salicyl.

Removal of offending teeth.

Guttæ Iodi (Farrer). Iodine 4 grains, Alcohol 90% 1 drachm, Glycerin to 1 ounce. *See also* TINCT. IODI FR. CX. 1908, for 'intensive' treatment.

Rheumatoid Arthritis. *Seek infective focus.*—Actæa, Adrenalin, Arsenic, Aspirin, Aspriodine, Colchicum, Emulsio Paraff. et Bismuth., *Ferri Iod. Sacch.*, *Formates*, Guaiacol Carb., Iodoprotein, Lithium, Magisal, Morrhuæ Ol., Pot, Brom. and Iodid., Sedasprin, Tylcalsin, Tyllithin, Thymus and Thyroid *Vaccine.*

Inoculation with Calf Vaccine Lymph has relieved pain.

Ac. Formic Injections, Hyd. Oleas c. Morph., *Radiant Heat*, Radium and Emanation, *Sulphides (baths of)*, *'X' Rays*, Ung. Sabinæ in conjunction with Cantharides. Salol *Collodion*, *Iodine, and Salicylic Ions*, *Blister applied to the spine. B. Coli Vaccine intravenously.*

Milk (sterilised) injections in arthritis (especially gonorrhœal). *Dose* 4 Cc increased.—Med. Rec., July, '20, p. 47; Pres., Oct., '20, p. 375.

The commonest cause of infection is found in connection with the teeth sockets.—X-Ray examinations. Sir W. Willcox believes in the infection theory as opposed to Uric Acid. Etiological factors. Streptococcal or B. Coli infections—B.M.J., June i./21,804, *see also* W. J. Midelton, B.M.J. ii./21, 462.

Pathway of infection in the rheumatic group of diseases—mouth, teeth, gums and tonsils.—G. L. Kerr Pringle, Pr., Oct. 1921, p. 229.

Depressing surroundings, damp and cold, clay soil, business or domestic worries are factors. Massage often useless. Ionic medication good.—Naunton Davies, Pr., Dec. 1921, p. 432.

'T.A.B' Vaccine to produce a non-specific reaction. Large doses, *e.g.*, 250 or 500 mills. at first and subseq. 1,000 and even 2,000 mills. It is worth trying effect of a vaccine made from the teeth or bowel organisms.

B. Coli vaccine intrav. will supersede autogenous subcutaneously.—H. Laurie, per Jl. Trop Med., Oct. 15/23,320.

Rhinitis Atrophic.—*Borax.*, Zinc Sulphanilas packing. *See also* Catarrh, Nasal.

For consideration of Acid-Fast and Alcohol-Fast organisms in, as found by Wyatt Wingrave, *see* B. Tuberculosis Vol. II.

Rhinitis.—*See* **Catarrh, Nasal.**

Rickets.—Acid. Phosph. Dil., Calcii Hypoph. Syrup., Calcis Liq. Calcii Chlorid. Elix, Calc. *Lactas*, Phosph., Lacto-phosph., Syr. and cum Ferro. Cinchona preps., Emulsio. Ol. Morrh. c. Glyceroph., Ferri Phosph. Syr., Ferri Iodid., Foods A, B and C, Glyceroph., *Glyc. Glyceroph. c. Med. Rub.*, Lecithin Emulsion, Liq. Ferri Hypoph. Co., *Liq. Iodo-Ferro-Mang. Pept.*, *Malt Ext. c. Hæmoglobin*, *c. Pancreatin*, *etc.*, Marrubin (and Comps.), Morrhuæ Ol., Ol. Morrh. Phosph., Omnevit, Phosphorus, *Milk and Glyceroph.*, Sodii Phosph., Thymus, Thyroid, *'Three Gland and 'Four Gland' Elixir and Tablets*, Trilactine.

Cod Liver Oil, Butter and Suet have well marked preventive action.—E. Mallenby, L. i./19,407. *cf.*, Fat Soluble 'A' Accessory Food factors.

Sunlight, Artificial "sun."

Rigg's Disease. *See* Pyorrhœa Alveolaris.

Ringworm.—*See* **Tinea.**

Rodent Ulcer. *Local use.*—*Chromic Acid*, Scarlet 'R,' Carbonic Snow, Radium, "*X*" *Rays*, *Zinc Ions.*

Saint Vitus's Dance.—*See* **Chorea.**

Saliva, to promote.—Ether, Ginger, Horseradish, Iodides, Jaborandi, Mercurials, most Emetics, Mustard, Pelletierine, Pepper, Physostigma, *Pyrethrum Glyco-gelatin* (*Pastils of*), Tab. Formalin, Tobacco.

Saliva, to check excessive.—Acid. Hydroch. Dil., Atropine and Belladonna, Chlorates, Coto, Picrotoxin.

Acid. Boric., *Alumen*, *Borax*, *Chlorates*, *Creosoti Vapor*, Formosyl.
Of Syphilis after excessive Mercury: Sodium Chlorate *q.v.*

Sarcinæ.—Ac. Sulphuros., Betanaphthol, *Bisciniod*, Calcii Chlorid., Salol, Sodii Hyposulphis, Sodii Metabisulphis, Sodii Salicylas, Sodii Sulphis.
Lavage.

Scabies.—Ac. Sulphuros, *Calcis Sulphurat. Lotio*, *Cyllin*, *Hydrarg. Perchlorid. Ung.*, Formosyl and Perfumed, Nascent Sulphur, *Liq. Carbonis Detergens*, Lotio Boeck, Manganese Butyrate, *Naphthalin Ung.*, *Naphthol Ung.*, *Peru Balsam*, *Pig. Thymol*, *Potass Sulphurat. Balnea*, *Styracis Ung.*, *Sulphur Ung.* Ung. Ac. Salicyl 50%, Ung. Resorcin Co., *Ung. Rusci Co.*, Ung. Thorii-Oleat.

Chlorine successful in the Army. The gas is fatal to the acarus—one to two parts per 1,000 of air by volume. Gas helmets worn as protection. Exposure 5 minutes on successive days—usually four.—G. H. Clark and H. S. Raper, B.M.J. ii./17,113.

For a Sulphur prepn. used at Copenhagen *see* B.M.J.E. i./24,86.

Scalds.—*See* **Burns.**

Scarlatina.—Aconite, Ammon. Carb., Antistreptococcic Serum, Belladonna, *Calcium Sulphid.*, Ozonic Ether, Pot. Cit., Potassii or Sodii Chloras

Antiseptic Gargles and Mouth Washes, *Compress of Salicylic Acid 2% in Alcoholic Solution.*

Scarlet fever infection is not conveyed by air.—F. H. Thomson, L. i./16,341.

Eucalyptus and Carbolic Oil treatment of scarlet fever a failure—all cases of scarlet fever should be isolated for at least 8 weeks.—G. Gushue-Taylor, L. ii./23,505.

Scar Tissue.—To relax and remove. From gullet, stomach, also uterine adhesions.—Cicatricine and Inj. Thiosinamin Sod. Salicyl.

Sciatica.—*Discover if possible infective focus and remove—Vaccines.* Acetanilide, Actæa, Alum Aceto-Tatras, Aspirin, Aspriodine, Amidopyrin, Aspirinate, *Biscinio*d, Cap. Colch. Salicyl., Codein., Colchicum, Conf. Guaiac. Comp., Ether Inj., Lithii Citras, Methylene Blue, Morphinæ hypod., Oleanodyne, Phenazone (and Injected c. Cocaine), Opium Ext. with Valerian or Suppos. with Cocain, Piperazine, Pot. Iodid., Quin. Salicyl., Salol, Sedasprin, Sodii Salicylas, Strychnine, Terebinthinæ Ol., 'Theo-Sod.-Acet.,' 'Theo-Sodo-Form,' 'Theo-Sodo-Sal.,' Trilactine, *Tylcalsin*, *Tyllithin*, *Tylcalsin intravenously*, Quin-Urea inj.

Aconitinæ Ung., *Bellad Lin.*, *Chlorof. Lin.*, *Ether inj.*, *Menthol c. Camph.*, *Menthol Lin.*, *Methysal Balm*, *Veratrinæ Ung.*

Scrofula.—Arsamin and other Org. Arsenic, Calc. Lact., Calcii Chlorid., Calcii Phosph., Calcii Sulphid., Elix. Hæm. c. Lecith., *Ext. Malti cum Iodinol*, Ferri Iodi d. Syr., Ferri Phosph., Hyd. Iod. Virid., Iodoprotein Tabs., Iodum, Marrubin and Comps., Morrhuæ Ol., Omnevit, Pot. Sulphurat., Quinine preps., Sodii Phosphas, *Sirop Neurotonique*, *Syr. Iodo-Tannic*, *Syr. and Vinum Tann-Iodo-phosph*, *Chaulmoogra Oil.*

Scurvy.—Arsenic and Iron, Calc. Lact., Lime or Lemon Juice, Phosphorus, Potass. Chloras and Citras, Red Bone Marrow, Sodii Citras, Sodii Lact.

SCURVY, INFANTILE.—The anti-scorbutic factor of Lemon Juice after removal of acids, etc., likely to be irritant has been used clinically—the equivalent of 6 to 12 lemons daily.—A. Harden, S. S. Zilva, and G. F. Still, L. i./19,17.

Cf., 'Water-Soluble C' Accessory Food Factors.

Sea-Sickness.—Acid. Hydrobromic., Antipyrine, Amyl Nitris (inhaled), *Bon Voyage*, Chloralamide, Chloral Hyd., Chloroform and Tinct. Co., Chlorof. Caps., Cocainæ Hydrochlor., Hyoscyamina ($\frac{1}{200}$ gr. *per os* good), Iodi Tinct., Morphinæ inj. hypod., Nitroglycerin Tablets ($\frac{1}{200}$ gr.), Phenazone, Pot. Bromid., Sedasprin, Sedeff, Sod. Brom., Sodii Nitris, Malourea and Sodium Malourea.

Counter-irritants to stomach, Ice-bags to the spine.

Ipecacuanha Wine to 2 to 3 minim doses as required is specific.—A. T. Thompson.

Sedative treatment: Liquor Iodi Fortis, Dilute Hydrocyanic Acid, *a.a.* 12 minims, Water to 6 ounces. One ounce every 10 minutes. Four doses taken effectual. Then *Aperient*: Black Draught. *Subsequently* tonic, Potassium Bromide, Strychnine, Gentian, etc. Successful.—A. H. Hare.

Seborrhœa.—*Formosyl Ointment*, Isopropyl Alc. (diltd.), Resorcin Lotion and Ointment, Sulphur and Salicylic Acid Ointments, *Thorii Oleat. Ung.*

Dandruff to Remove.—Wash the head with soap and spirit and then dry. Rub in well an ointment of Precip. Sulph. gr. xv., Salicylic Acid gr. xv., Soft Paraffin 1 ounce, or if greasy applications disliked a lotion of Salicylic Acid 2 drachms, Castor Oil 3 drachms, Eau-de-Cologne 1 ounce, S.V.R. to 6 ounces. In chronic cases Sulphur Præcip. ½ ounce, Glycerin 2 ounces, water to 4 ounces. C. D., Sept. 22, 17.

SENESCENCE (PHYSICAL DETERIORATION) AND SENILITY. A paper describing work at Chelsea Hospital.—L. i./22,874.

Septicæmia and Pyæmia —Acid. Salicylic, Acriflavine, Antistrepto. Serum and *Vaccine*, *Antistaph. Vaccine*, *Sensitised Vaccines*, Eusol intrav., Ferri Perchlor., Hyd. Benz., Nuclein, Peptone Injections, Quinine, Resorcin, Salicin, Sulphites, Saline Injection.

Dakin's Solution must *not* be given intravenously.

Shingles —See **Herpes Zoster.**

Shock, Surgical.—Adrenalin, Brandy hypod., Caffeine Sod. Sal., Calc. Chlorid. Injn., Camph. in Ether, Ergot, Ether, Gum Acacia in Saline (or plain) Morphine, Oxygen with Alcohol, Pituitary, Surpa-renal, Strychnine.

Intracardiac injection of Adrenalin Solution 1 Cc., *v.* p. 962.

Sickness.—*See* **Vomiting**, also **Sea-Sickness.**

Sinuses, Tuberculous.—Iodoform preps., Creosoted Oil.

Skin .—*See* **Eczema, Psoriasis, &c.**

Skin Disinfection.—*See* SKIN STERILISATION.

Skin Irritation. (*Local use*).—Acid. Hydrocyan. Dil., Corrosive Sublimate lotion, Cremor Sicc. preps., Formosyl Cream, Lot. Calam., Sodii Carb., Zinc Cream, see also ECZEMA.

Skin Proliferants.—Allantoin, Acriflavine, Symphytum, Scarlet R.

Skin Sterilisation.—2% Iodine in 70% Alcohol, Mercuric Chloride 1 in 500 in Spirit, to 1 in 2,000. Biniodide and Spirit. Eau de Cologne has been used. Alcohol alone is efficient; Perfumed Formosyls, 'Propyl' Tinct. Iodi.

Sleepiness.—Tea, coffee, Digitalis, Pituitary or Thyroid suggested.

Sleeping Sickness.—*See* **Trypanosomiasis**

Sleeplessness.—*See* **Insomnia.**

Small Pox.—*See* **Variola.**

Smell, Loss of Sense of.—Borated Hydrogen Peroxide.

Smoking Habit, Excessive.—*Wash the mouth out with Silver Nitrate, 1 in 250.* Anti-smoking gum. Formosyl Pastils.

Snake-bite.—Alcohol and Ammonia, Antivenom Serum, Pot. Permang., Strychnine inj., Calcii Chlorid. inj., Tinct. Ammon. Co. *Mist. Olea-Balsamica. Chloroform. Chloral cum Camphora, Cocainæ Hydroch. Liquor,* Hydrogen Peroxide.

Spray the part with Ethyl Chloride, whilst making incisions and rubbing in Potass. Permang. See also p. 547. Gelatin Inj. for hæmorrhage.

Cocaine Hydrochlor. injected in full doses at the site of puncture caused by fangs of the snake not only relieves the pain, but causes reduction of the swelling if promptly used. Well combined with *permanganate.* Oozing hæmorrhage which occurs from all mucous surfaces is reduced by taking large quantities of *gelatin* solution 5%, per os.—J. C. Fox.

Sneezing, Spasmodic.—Calcii Chlorid *q.v.*

Spasm.—Æther, Ammon. Arom. Spt., Amyl Nitris, Atrop. inj., Belladonna, *Benzyl Benzoate,* Cajaput Ol., Camphora, Chlorof. and inhaled, Chloromorphiæ Liq., Erythrol Nitrate Tablets, Ext. Grindeliæ Liq. (of larynx). Mannitol Nitrate Tablets, Menth. Pip. Ol., Mistura Ætheris cum Ammonia, Opium, Papaverine (Gastric and Intestinal), Piscidia.

Speech Fright.—*See* **Stage Fright,** also **Nervousness.**

Spermatorrhœa.—*See* **Incontinence of Semen.**

Spina Bifida.—*Iodine Liniment, Iodo-Glycerin injection.*

Sporotrichosis.—Potass. Iodid.

Sprains.—*Arnica, Fomentations (hot) of Poppy-head or Belladonna, or cold with vinegar, or spirit lotions, Lead and Opium Lotion, Lotio Ammonii Chloridi.* When chronic, *Liniments of Belladonna, Chloroform, Camph. Co., Lin. Tereb. Acet., Radiant Heat, 'X' Rays.*

Spring Catarrh.—See Catarrh, Nasal, and Hay Fever.

Sprue—Calcium and Parathyroid (Harold Scott), Castor Oil, Cyllin, Koumiss, Milk Diet, Pepsin, Santonin and *Golden Santonin,* Ipecacuanha sine Emetina, Strawberry Ext. Ethereal.—*Trilactine Milk and Tablets* after Milk Meal. *Locally.*—Formosyl.

Sodium Bicarbonate 10 to 20 ounces of 2 to 4% solution intravenously slowly in addition to *per os* doses.—A. Castellani, B.M.J. i./21,338.

Hydrochloric Acid, 15 minims of 0·2%, before, and 10 grains of Pancreatin after, each meal, no dietary precautions being taken whatever. This treatment has been adopted along the entire coast of Queensland.—S. M. Lambert, per Jl. Trop. Med., Oct. 15/23,323. See also T. R. Brown, *ibid.,* Oct. 16/22,330.

Stage Fright.—Cannabis with Laudanum. Gelsemium (*q.v.*), Laudanum, Opium Pills, Opium with strong coffee (Morell Mackenzie), also with Sal Volatile and Camphor Water. Three deep inspirations valuable.

Stenosis of Pylorus, Urethra, &c.—Cicatricine, Opii. Tinct. *q.v.*

Sterility.—Ovarian, Subs. Testicular Subs., Corpus luteum. Certain Mineral Waters are advocated, *e.g.,* Eaux Bonnes.

Stings.—*See* **Bites.**

Stomach Dilatation.—Sodium Phosphate as nervine tonic. As antiseptics, to overcome fermentation—Bismuth Salicylate, Salol, Betol, Benzonaphthol, Eff. Sod. Mag. Aper., Trilactine Milk. See also GASTRIC SECRETION.

Stomatitis.—Hydrastis, Laudanum, Pot. Chloras, Sodii Bisulphis, Sodii Chloras.

Acid. Boric., Acid. Carbolic, Acid. Picric as paste (stomatitis mercurialis), *Acid. Salicylic, Acid. Sulphuros, Alumen, Borac. Glyc. and Mel., Calcis Aquâ, Collutorium Hydrog. Perox., Cupri Sulph.,* Formosyl Mouth Wash, Hydr. Perchlor. Lotion 1 in 5,000. Iodine Colloidal, Liq. Alum. Aceto Tart. as mouthwash, *Myrrhæ et Boracis Tinct.,* Perfumed Formosyls (diluted), Salol Mouth Wash, *Sodii Chloras,* Potass. Chloras.—*See* **Pastils.**

See abstract of article by Sir K. Goadby, p. 804.

Strictures.—Cicatricine, Radium (œsophageal). Ung. Thiosinamin.

Styes.—Copper Point or Copper Sulphate Solution

Styptics.—*See* **Hæmorrhage.**

Sunburn.—*See* **Freckles.**

Sunstroke.—Ammon. Carb., Apomorphina, Atropinæ inj. hypod., Bromides, Digitalis, Ergot, Hyoscina, Morphinæ inj., Quinine, Sedasprin, Veratrum.

Purgative enemata, Sinapis Emplastrum.

Sunstroke in the Tropics cured by Pilocarpine hypodermically with 1 or 2 minims of Croton Oil.—J. McOscar, B.M.J. ii./23,310.

Sweats.—*See* **Night Sweats.**

Sweating feet.—Alum Acet., Formalin, Formosyl, Pulv. Salicyl. cum Talco.

Sycosis. (*Local use*).—Arsenobenzol, Bismuth Oleas, Formosyl, *Ichthyol*, *Liq. Hydrarg. Perchlor.*, Hydrog. Perox. (1 to 2 vol.), Iodides externally, Ol. Tereb. in Oil Injectio, Manganese Butyrate, Perfumed Formosyls (diluted), Uranii Oleas, *Sulphur*, Ung. Cupri Oleat 10%, *Ung. Hyd. Ammon.*, *Ung. Hydrarg. Nit.*, Ung. Hydrarg. Sulph. Flav., Ung. Thorii Oleat ,' X ' Rays.

Sycosis and other chronic staphylococcic skin infections. Prevention and treatment.—H. G. Adamson, BM.J. i./18,8.

Synovitis.—Ext. Solani Liq. has been advised, *Mercurials*, Static Electricity.

Syphilis.—Antim. Sodii Tart., *Arsamin* and other Organic Arsenic Comps., Arsenobenzol alone and with Mercury and Injection of Patient's serum after, Auri Chlor., Barii Chlorid., Bismutol and other *Bi. Preps. (watch mouth)*, Calc. Iodo. Flumerin, Ricinol., Ferri Iodid. Syrup-Hectine, Hyd. c. Creta, Hyd. Cyanid., Hyd. et Pot. Iodid., Injectio Hydrarg. Intram. and other Mercurials, Iodinol, Iodoprotein, Iodum, *Iodine Colloidal*, Mercurialised Serum, *Mang. Butyrate*, *Muthanol*, Mist. Quin. c. Ferro, *Mist. Hyd. Perchlor. Co.*, *N.A.B.* (and *Guaiacol Glucose Sterules* for dissolving). Pot. Iodid. Pil. Quin, Hyd. et Opii, Protargol, Quin. Hydrochlor., Quin. Hydrochloro-Carbamid and Hydr. Perchlor., Quin. Nucleinas, Quin. Periodide, *Salicin*, Sarsaparilla preps., Sod. Iodid., Succus Alterans, Syr. Ac. Hydriodici, Tiodine.

Arsenobenzol preparations more efficacious than any other form of treatment available. Scrupulous care needed in giving.—Med. Res. Com., B.M.J. ii./22,184.

The ***Injectio Hydrargyri Intramusc.*** 10% (*vide* p. 460), is the *standard* preparation.—'Treatment of Venereal Disease in the Army.' *cf.* also p. 212 for ***War Office Method.***

For Methods of Diagnosis.—See Vol. II.

Arsamin Paste, *Hydrarg. Lanolin.*, *Hyd. Oleat. et c. Morphina*, *Hydrarg. Ung.*, Iontophoresis of Potass. Iod. Solutions. *Ung. Prophylaxis (capsules of).*

Syphilitic re-infection. Animal experiments tend to show it is possible.—B.M.J. ii./21,19.

Syphilitic Sore Throat.—*Alum Garg.*, *Borax Garg.*, *Chlorine Garg.*, Colloid Silver, Collutorium Hydrogenii Peroxidi, *Hyd. Cy. Garg.*, *Hyd. Perchlor. Garg. and Pastil.*, *Pot. Chlorat*, *Garg. Pastil. and Troch.*

Syphilitic Ulcers—*Acid. Chromic*, *Arsamin*, other Org. Ars. Comps., *Collod. Salicyl. c. Hyd. Perchlor.*, *Dusting Powder of Calomel and Bismuth*, *Hyd. Acid. Nit. Liq.*, *Hyd. Flava and Nig. Lotio*, Hyd. Iodas., *Hydr. Naphthol*, *Hyd. Oleat. Morph. et c.*, *Hyd. Subchlor.*, *Collod. Iodof.*, *Iodof. Wool*, *Ung.*, *Resorcin*, *Zinci Chlorid. Iodid. and Nitras*, *Ung. Antimonii*, *Ung. Arsenii Anserin. Ung. Iodi Intinct.* Internal Remedies, see Syphilis.

Tabes Dorsalis.—*See* **Locomotor Ataxy.**

Tachycardia.—Amyl Nitrite, Atropine, Cactus, Convallaria, Digitalin, Nitroglycerin, Parathyroid, Sparteine, Strychnine.

Tænia.—*See* **Worms.**

Tartar on Teeth, to dissolve.—Lotio Acidi Citrici et Phenolis.

Tattoo Marks, To remove.—Acid. Salicylic, Tannin and Silver Nitrate.—Ac. Nitric. (Ph. Form.), Glycerin Papain (?), Iontophoresis.

Refs. to Briault's work.—P.J. ii./12,557, see also C.D. ii./12,272.

Tetanus.—Anæsthetics (to relax spasms), *Antitoxin*, Amyl Nitris, Bromides, Cannabis, Chloral Hydras, Curara, Luminal-Sodium Inj., N. Saline Injections, Paraldehyde intrav., *Parathyroid*, Physostigmine, *Sodium Persulphate.*

Oxidising Antiseptics.—H_2O_2, Permanganate, Chlorine water and Iodine are unfavourable to growth of Tetanus Bacilli, but Phenol, Magnes. Sulph. have no apparent effect.

Curare (*q.v.*) cured after Tetanus Antitoxin failed.

Tetany.—Parathyroid. Some good results have been reported.—Prof. Swale Vincent, L. i./23,130. Large doses of *Calcium Lactate* in conjunction.—Davies B.M.J. i./23,512. Ol. Morrhuæ.

Thirst, to Relieve.—Acid. Citric., Acid. Phosph. Dil., Acid. Sulph. Aromat., Acid. Tartaric., *Ammonium Iodide*, Aspirin, Aspriodine, Coca, Formalin Tablets (Internal), Haust. Imperialis, Mucin, Magisal, Pot. Chlor. Tablets, Pot. Cit., Pot. Tart. Acid.

Throat, Inflammation of, and Tonsillitis—Acid. Salicylic, Aconit, Tinct. and Pastil, Ammon. Brom., Antimony, Belladonna, Broadbent's Mixture, Calc. Sulphide, Cyperi Caps. or Mist., Elix. Sod.Lact. prior to operation, *Fe. Salicyl.*, Formalin Tablets (Internal), Guaiacol, *Lichenoids*, Liq. Ferri Perchlor., Phenazone, Quinine HCl. Acid. as spray or paint, Quininæ Salicylas, Salicylates, Sodii Benzoas, Sodii Bicarb., Solubes (various), see Index, Strepto. or other Vaccine, Tab. Formalin (to suck), *Tylcalsin, Tyllithin.*

Adrenalin Spray, *Benzoin, Tinct. Vap., Chlorates in Troch., Cocaine (Pigment of)*, Colloidal Argent. and Hydrarg., *Guaiaci Troch., Iodi Vapor, Monsel's Sol.*, Sod. Perbor., *Thymaglycine.*

Throat, Relaxed Sore.—(*Local use.*)

Ac. Carbol. Pastil., Ac. Tannic Glycerin, Alum. and Glyc. Aluminis, Alum Aceto-Tart. Liq. and Alum Format. Liq., *Ammon. Chlorid Vapor, Argent. Nit., Benzoin. Tinct. Vap., Bism. Past., Elixir Guaiaci, Ferri Perchlor. Pig., Guaiaci Troch., Hydrastis Tinct., Iodine Colloidal*, Lichenoids, *Phenoloid Tablets, Pini Sylvest. Vapor, Solubes (various)*, see Index.

FOLLICULAR TONSILLITIS—Eusol. Calcium Sulphide said to be specific.

Thrush.—*See* **Aphthæ.**

Tic Douloureux.—*See* **Neuralgia.**

Tinea Favosa and Sycosis. (*Local use*).—*Ac. Carbol. Glyc., Ac. Salicy, Ungt.* (50%), *Acid Sulphuros, Croton Oil, Chrysarobinum*, Cupri Oleat. Ung., *Ethyl Chloride, Formaldehyde, Hyd. Oleat.*, Hyd. Iodas, *Hyd. Perch. Lotio.* Hyd. Perox., *Iodi Linim*, Nicotinæ Salicyl., Petroleum of Commerce, *Picrotoxin Pigment*, Pig. Acid Picric et Camph., *Pyrogallol, Resorcin*, Sodii Chloridi Ung., *Sod. Hyposulph. Lotio*, 'X' Rays. Copper Ionised.

Apply *Whitfield's Ointment;* Benzoic Acid 1, Salicylic Acid 1, Cocoa Nut oil 12, Vaselin to 30, *or* first mop with Tincture of Iodine, then rub on Silver Nitrate 1, dissolved in Spirit Nitrous Ether 50. Repeat and apply the ointment between whiles.—H. G. Adamson.

Tinea Tarsi.—See **Ophthalmia Tarsi.**

Tinea Tonsurans and Circinata. (*Locally.*)—As for **T. Favosa** and—Colloidal Ag. and Hg., Cupri Oleas, Ferri Perchlor. Liq., *Formosyl, Hydrarg. Nit. Acid. Ung., Iodi et Olei Picis Pigment, Iodized Phenol, Izal*, Sphagnol, *Salicylic Acid*, Sodii Carb. Cryst. melted hot, *Sulphur, Ung. Hyd. Iodid. Rub., Ung. Potass. Sulphurat.*, Ung. Sodii Chloridi, *Ung. Sulph., Naphthol Salicylat*, Ung. Thorii Oleat., 'X' Rays.

Tinea Versicolor.—*Acid. Chrysophanic., Acid Sulphuros., Borac. Glycerin*, Colloidal Ag. and Hg., *Formaldehyde, Lotio Calcii Sulphurati, Sodii Hyposulph. Lotio.*

For various forms of tinea the following lotion is recommended. Resorcin 2 drachms, Compound Tincture of Benzoin to 1 ounce.—A. Castellani, L. i./20,943.

Ringworm of nails treated by solution of Acid Salicylic 1 drachm in 1½ ozs. Methylated Spirit painted on after scraping every night and without scraping every morning. To be used three months or longer.—R. Craik, B.M.J. i./20, 185.

Epidermophytosis or eczematoid ringworm well treated by swabbings with 1 in 1,000 or even 1 in 5,000 solution of Potassium Permanganate.—L. ii./22,578.

Tinea cruris. Ung. Chrysarobin B.P. will effect a cure in six days if applied thickly on lint twice daily. Salicylic Ointment takes longer. Salicylic Collodion useful for small or scattered lesions.—L. ii./22,791.

Tinnitus Aurium.—Brominol, Iodinol, Pilocarpine Injection.

Digitalis in the pulsating form, Bromide (useful at bedtime and often gives great relief), hypnotics, sedatives, Paraldehyde, Potass. Iodide (where associated with vertigo), Pilocarpine (in cases showing Menière's symptoms.

Thiosinamin (hypod). *Iodum Oleatum.*

Toenail, Ingrowing.—Lead Nitrate as dusting powder.

Toothache.—Atropine Methyl Bromide with Aspirin, Pil. Butyl-Chloral Hyd. c. Gelsem., Gelsem. Tinct., Magisal, Piscidiæ Ext. Fluid., Quin. Tinct. Ammon., Sedasprin.

Acid. Arsenios., Acid. Carbol. c. Collodion, Benzyl Alc., Butyl-Chloral c. Menthol, Caryoph. Ol., Chlorof. c. Camph., Chlorof. c. Mastic, Cocainæ, Cocaine-Menthol-Eugenol, Cocaine-Menthol-Phenol, *Creosotum, Eugenol, Iod. et Aconiti Tinct., Liq. Sodii Carbol., Menth. Pip. Ol., Opii Tinct., Pasta Arsenicalis, Pot. Permang., Pyrethri Tinct., Res. Carbolica. Sod. Peroxidum.*

Tonics.—*See* **Anæmia, Debility, Fevers, Rickets, etc.**

Tonsillitis.—*See* **Throat and Pharyngitis.**

Some remote effects of tonsillitis. *Inter alia*, the tonsil is a focus for arthritic infection.—A. B. Pavey-Smith, Pr., April 22/271.

Toxæmia.—Calc. Chlor. intram., Ether, *Eusol intrav.*, Purgatives, Diuretics: Jaborandi, Sal Volatile, Stimulants, Strychnine.

Toxæmia, Alimentary.—Acid HCl., Emulsio Paraff. et Bismuth, Kaolin: Charcoal, Liq. Chlori, Trilactine.

Trachoma.—Adrus. Preps—Radium Rays—good results. Acid Carbonic Snow. Copper Sulphate (and Ionisation of), Silver Salts. See also Cancer.

In treatment of first stage Silver Nitrate in solutions varying from 5 to 60 grains per ounce, preferably 10 grains, or Copper Sulphate applied as sticks to the affected areas of the conjunctiva. These are best exposed by ballooning the fornix with subconjunctival injection of Saline, including 4 minims of 4% Cocaine and 4 minims of Adrenalin Solution. Treatment of complications such as trichiasis and pannus, the latter occasionally by peritomy and corneal ulceration by use of Scarlet 2% in Olive Oil are called for later. *Dionine* for promoting absorption of corneal opacities and instillation of 5% infusion of crushed Jequirity Seeds are of value. Secondary infection, *e.g.* by Morax-Axenfeld and Koch-Weekes bacteria are combated with Zinc Sulphate and Silver Nitrate drops respectively. In gonococcal and especially streptococcal infections eye baths of Saturated Magnesium Sulphate Solution are most useful.—Lieut.-Col. H. Kirkpatrick, L. i./21,1304.

Trichinosis.—Ergota, Ergotin, Liquor Arsenicalis, Scelrotic Acid.

Treated by combatting gastro-intestinal symptoms and fever with Bismuth Salicylates and Quinine. Later, Dimol, when the true nature of the disease had been found. Antimony Tartrate, intravenously, would possibly be of use.—D. A. Rice and co-workers, L. ii./22,799.

Trypanosomiasis and Tick Fever. (*Local use.*)—Arsenic (Sodium Arsenate), Arsamin and other org. arsenic comps. *q.v.*, Antim. Oxid. Inj., Antimonii-Sodii Tartras, Auramine (?), Fourneau '309,' Bayer '205,' Mist. Antim. et Pot. Iod., *Methylene Blue*, Novarsenobenzol and injection of patient's serum treated with.

Tuberculosis, Laryngeal.—*Ac. Lactic Spray or Pigment*, Ac. Picric, Inhalation, *Boric Acid Insufflated*, *Cocaine* (*Lozenges and Spray*), Eusol, Gutta Cinnam. Co., *Iodoform*, *Iodine Inhal.*, *Menthol in Olive Oil*, *Morphine*, *Pastil. of Cubebs*, *Pot. Chlorate or Ipecac.*, *Silver Nitrate Spray*, Tuberculins, Vapo Creosot Co., *Vap. Ol. Pini Sylv.*

Tuberculosis.—*See* **Phthisis.**

Typhoid Fever.—Carbo Anim., Cinnamon Oil, Carbolic Acid, Cinchon Alks., Emetine Hyp., Guaiacol, Hyd. Subchlor, and Perchlor., Hydrog. Per oxide, Iodates, Iodine Tinct. and Phenol dil. to drink, Magnesii Salicylas, Mist. Chlori c. Quin., Naphthalene, Naphthol (*a*), Olive Oil, Phenyl-Aspriodine, Platinum Coll., Salol, *Santonin*, Spleen Subs., *Sodii Acid. Sulph. as water disinfectant*, Sodii Chloras, Soda Chlorinata, Sod. Nucleinate Inj., Sulphur, Sulphurous Acid, *Thorium Sulphate*, Thymol, Vaccines and Sensitised Vaccines (T.A.B.), also Multiple Vaccines (Castellani), Tribromophenol, Trilactine Milk, Turpentine Oil (per rectum), *Tylcalsin*, *Tyllithin*.

Hæmorrhage, Intestinal from: Calcium Chloride, *Crocq's Pill*, Argent. Nitras, Ergot, Pil. Plumbi Acetatis cum Opio, Turpentine.

Locally Allantoin, Alcohol Compresses, Colloidal Ag. and Hg., *Hyd. Perchlor. intrav.* For rectal feeding see Enemata.

Heart Failure In.—Caffein Sod. Benz., Camphor, *e.g.*, Curschmann's Solution.

Venous Thrombosis in—intravenously 0·5% Sodium Citrate up to ½ pint.

Typhus. See Vol. II.

Ulcers. *The following are chiefly for local use; see text. Ac. Boric., Ac. Carbolic., Ac. Chromic.*, Ac. Lactic, *Ac. Salicyl.*, Alii Succus, Allantoin. *Argent. Nit., Bism. Oxyiodid.*, Borated Hydrogen Perox., Brilliant Green, Calc. Sulphide Stearettes, *Carbonis Cataplasm Collodium*, Colloidal Metals, Cupri Acet., *Cupri Oleat Ung.*, Elix. Calc. Iodid., *Eusol*, *Fermenti Cataplasm*, Formosyl, Glyc. Bellad., *Hamamelis*, Horse Serum, *Hydrogen Peroxid.*, Iodates, *Iodoform*, *Iodol*, Methysal Balm, *Naphthalin*, Nuclein Inj., *Oxygen*, Unna's Paste, Pasta Amyli Iodid., Paste Carbonis et Zinci, Parathyroid, Paraffin No. 7, *Plumbi Subacet. Glyc. and Ung.*, *Pot. Permang.*, Radium, *Resin. Ung. and Res. Ung. c. Chlorof.*, *Resorcin*, *Salol*, *Sanitas*, Scarlet 'R.,' Sod. Cit. locally to soften, Sphagnum, Strepto. Vaccine, Toluol, Trilactine,

Ung. Pheno-Boric., Ung. Pot. Chlorat. et Zinci, Ung. Thorii Oleat., *Zinci Chlorid.*, *Zinci Oleat. Ung.*, *Zinc Perox.*, *Zinci Sulph. Solube* as *Lotio*, Zinc and other Ions.

Tropical ulcers well treated as follows :—Daily bath for 1 hour with Mercuric Chloride 1 in 2,000, followed by Boric fomentations every 4 hours ; the following ointment then applied—Zinc Oxide, Salicylic Acid, Ammoniated Mercury Ointment, Vaseline, equal parts. Put on ½ inch thick and leave for 3 days without dressing. Leg should be rested. Rapid improvement.—N. Cantlie, Jl. Trop. Med., Feb. 1/23,38.

Ulcer Duodenal.—Cocaine Period., *Mist. Bismuthi Phenolis et Morphinæ* is useful.

Koalin for lubricant effect is also suggested.

To counteract constipation resulting from Bismuth give *Pil. Hyd. Subchlor.*, *Rhei, Cascaræ et Capsicin.* When active symptoms subsided a tonic of Papain 2 grains, Phenol 2 grains, Strychnine $\frac{1}{30}$ grain, Codeine ¼ grain. Rhubarb Ext. ¼ grain.—Guthrie Rankin, B.M.J. ii./10,181. Significance of symptoms in duodenal ulcer.—Mansell Moullin, L. i./12,563.

Succus Allii diluted with three times quantity of water.

Ulcer, Gastric.—Aperfine, Argenti Nit., Ferri Perchlor., Gelatin, Glucose, Inf. Symphyti, Mist. Bismuth. Phenol et Morph., Horse Serum, N. Saline Inj., Ol. Olivæ.

Kaolin for lubricant action is suggested.

(1) promote healing by plenty of nourishing food ; (2) " fix " the gastric acid and so prevent it from interfering with healing by ensuring that the food contains a large proportion of protein ; (3) prevent distension of the stomach by small feeds. Milk and egg diet supplemented by Iron and Bismuth. Pain disappears early, vomiting quickly subsides and relapses are rare.—Hutchison.

Diagnosis.—*See* Stomach Contents Examination.

Toxic symptoms from very large doses of alkalis in peptic ulcer.—A. F. Hurst, L. i./23,1288.

Neither gastric nor duodenal ulcer, colitis, appendicitis nor cancer in any form seen in the Orange Free State amongst Basuto Negroes. Similar remarks as to the Himalayas and South America.—F. P. Fouché, B.M.J. i./23,1116.

Uræmia.—Aconite, Atropine, Bromides, Caffeine, Cannabis, Digitalis, Elaterin Pulv. Co., *Erythrol Nitrate*, Hyd. Subchlor., Lithii Hippuras, Nitroglycerin, Papaverine, Parathyroid, Pilocarpine, Saline Purgatives, *Saline Solution*, Scilla, Sodii Benzoas, Strophanthus, Venesection.

Uræmia and Albuminuria treated by 1 Cc. of 1% *Pot. Permang.* hypod. Almost complete suppression of urine reacted to 10 drops of ½% solution. Some local pain at site of injection, but this is relieved by hot fomentation. —F. V. Davison, L. i./16,430.

Uræmic Convulsions.—Bromides, Chloral (per os or per rectum), Chloroform, Jaborandi, Morphine, Saline Solution, venesection or catharsis, may prolong life.

Urethritis.—Argent. Nit. (0·02 to 0·1%) Irrigation or combined with Hydrogen Peroxide (1 to 2 volume), Glyc. Resorcin, Mang. Butyrate, Mercurochrome, Santalol and Tablets, Turpentine by means of catheter. *See also* GONORRHŒA.

Uric Acid Diathesis —*See* **Gout, Rheumatism.**

Urinary Calculi.—*See* **Calculi.**

Urine, To render Acid.—Aspriodine, Benzoic Acid, Sod. Phosph. Acid (the natural acid of the urine), Salicylic Acid (increases acidity slightly). Large doses of Citric or Tartaric Acid.

Urine, to render Alkaline.—Potassium, Sodium, Lithium, Calcium Tartrates, Citrates and Carbonates.

Urine, Blood in.—Ammon Chlor., Calc. Lactas : Iron Salts.

Urine, Incontinence of.—*See* **Incontinence.**

Urine, Tests for Albumin, Sugar, etc.—See Vol. II.

Urinary Antiseptics, *See* **Antiseptics, Urinary.**

Urticaria.—For Diagnosis, Protein Skin Tests. Bromides, Calcii Lactas, Cream of Tartar, Elix. Sod. Lact., Harrogate Water, Magnesia Cream, Milk and Glycerophosphates, Mistura Alba, Peptone Injections, Pituitary, Sodii Bicarb., Sulphur (Stearettes), *Terebene*, Trilactine.

Acid. Benzoic, Boric., Carbolic Lotio, Hydrocyan. Dil., Chloroform, Cremor Sicc. Preps., Liq. Hamam., *Ung. Cocaina*, Perfumed Formosyls, *Plumbi cum Lacte Lotio, Sodii Carb., Balnea, Zinc and Starch Powder.*

Uterus, Catarrh of.—*See* **Catarrh, Uterine.**

Uterus, To promote Contraction of.—Cimicifuga. Cornutine, Ergot. Preps., Gossypii Rad. Cortex, Hamamelis, Hydrastis, Pituitary Ext. Liq. (Posterior lobe), Saccharum, Ustilago Maidis.

If *malaria* be diagnosed in pregnancy give Quinine or Quinidine at once—divide dosage into 2½ or 5 grain doses every 2 or 4 hours. For further details see p. 721.

Uvula, Relaxed.—*Gargles of Alum, Catechu, Ferric Chloride, Kino, Pigment of Glyc. Tannin, Pot. Chloras, Rhatany, Kino or Tannin Lozenges, Zinc Sulph.* or *Zinc Chlor. Gargle and Pigment.*

Vaccination, Dressing after.—Vaccination Shield, Picric Acid, *q.v.*

Vaginitis. Ovules var. (*q.v.*), Argent. Proteinas. Formalin Dil. (*q.v.*), Pess. Ac. Lactic., B. Ac. Lactic Paste in milk freshly made and smeared on.

Varicella.

Chicken pox is air borne—early in the disease, but it is difficult to determine the exact time it ceases to be so. It may uncommonly be conveyed by air on the third day, but apparently not afterwards. It is needless to keep chicken pox patients to end of the scabbing stage separate from others.—F. H. Thomson, L. i./16, 3411. See also Table of Diseases.

Vesicles should be painted with Iodine from the first; prevents scarring.—C. Corben, B.M.J. ii./19,135.

Varicose Ulcers.—Calcii Chlorid., Calcii Iodid., Parathyroid Gland. Locally *Allantoin*, Flavine. *See also* ULCERS.

Varicose Veins.—Tinct. Nucis Vom., Tinct. Hamamelis in Spt., Iodine Injection (Schiassi's Method).

Also Liq. Ext. lightly applied—see recent notes p. 454.

Quinine Hydrochloride 4, Urethane 2, Aqua Dest. 30. ½ to ½ Cc. injected intrav. and repeated 8 cm. further up the leg, not more than 4 Cc. being injected at one time—repeated a week later.—B.M.J.E. i./24,70.

Variola.—Hydrarg. cum Creta (*q.v.*) 10 grains *ter die*, appears to abort.

Variola, To prevent pitting.—*Acid. Boric. Ung., Acid. Carbolic. Ol., Argent. Nit., Calcis Linim., Collodium, Hydrarg. Ung.*, Iodine Dilute, *Phenol pure, Styptic Colloid., Zinci Oleat. Ung.*

Potassium Permang. (*q.v.*) Bath 5% or less. Izal Dilution, Bath of.

Vasodilators.—*Amyl Nitrite Sterules*, Benzoates, *Cinnamates, Coumarates, Erythrol Nitrate*, Hippurates, *Mannitol Nitrate Tablets, Nitroglycerin Tablets*, Sodium Nitrite, Spirit of Nitrous Ether, Thyroid Extract.

Venereal Diseases.—*See* **Syphilis. Gonorrhœa, Chancroid.**

Vermicides.—*See* PARASITES and WORMS.

Vertigo.—Acid. Hydrobromic (with a little Quinine), Adrenalin *per os*, Ammon. Spt. Arom., Aspriodine, Nitroglycerin Tablets, Caffeine, Guaranæ, Quininæ Valerian, Strychnine, Zinci Valer.

Vincent's Angina.

Vincent's spirochætæ and Fusiform Bacilli—infection of mouth, eyes and penis. Mixture of Arsenic and Ipecac. as also the *Pigmentum Ipecacuanhæ et Arsenici* (*q.v.*) applied to the mouth, cleared up the condition.—F. B. Bowman, L. ii./17,536.

Salvarsan topically is better than a mixture of hydrogen peroxide, Ipecac. Wine and Glycerin.—B.M.J. ii./17,404.

Ulcerative gingivitis.—Vincent's Angina well treated by thorough irrigation with *Iodine* or *Arsenical* preparations—the former in preference.—J. F. Colyer, B.M.J. i./18,205. Better than Iodine may be to gargle with *Hydrogen Peroxide* 3 or 4 times daily and after every gargle to apply to the diseased spots a mixture of *Quinine Hydrochloride* with aqueous *Methylene Blue* 3 to 5%.—*ibid*, 220.

Trichloracetic Acid (*q.v.*) said to be specific.

Voice, Loss of.—Cocaine, C.L.O. Emulsion, Erysimum Syr., Formosyl, Lichenoids, Pastils, Menthol, Ozonic Inhaler, Pot. Permang. Solube, or Solub. Phenol, dissolved as gargle, Pot. Chlor and Borax, Rhatany, Solube Borax Co., Throat Pastilli (Glycogelatin, *q.v.*), Tab. Formalin (to suck).

Amyl Nitrite and other Vasodilators with success in hysterical aphonia.—*Vide* Amyl Nit.

Vomiting.—Acetanilide, Arsenic, Acid. Carbolic, Acid. Hydrocyanic. Dil., Ammon. Bromid., Beef Essence (Brand's), *Bisedia*, Bismuth preps., Calcii Chlorid., Calcis Aqua, Cerium Salts, Chloral, Chloroform preps., Coca and Cocaina, Cremor Magnes., Elixir Gentianæ Acidum, Hydrog. Perox., Iod.

Tinct., Magnes. Carb., Liq. Morphin. hypod., Nitroglycerin., Nux Vomica, Pot. Bicarb. c. Acid. Citric Mist., Efferves., *Sedeff*, Sodii Phosph. Eff., Vin. Ipec. in minim doses, N. Saline per rectum. Of infancy, Sod. Bicarb.; of Pregnancy, *see* **Pregnancy.**

Vomiting, Post Operative.—Adrenalin *per os*, Chloretone, Cocaine subcut. See also Vomiting if patient able to take internally. For vomiting after Chloroform,—a few drops of Chloroform on Sugar.

Vomiting, Cyclic or Recurrent.—Glucose Injection, Rectal Feeding.

Sod. Bicarb. 1 dr. in N. Saline intrav.

Cyclic vomiting in children. *Continued* use of Sod. Bicarb., 20 grains twice daily to a child of 3 to 7 years and 25 to 30 grains to older children, in 3 tablespoonfuls of cold water. Milk should be reduced to a minimum and cream avoided altogether.—G. F. Still, L. i./23,1328.

Habitual vomiting in infants cured by Lactate of Mercury. Allusion to congenital syphilis in infants suffering from habitual vomiting.—Dorlencourt, per Clin. Jl., July 25/23,352.

Warts and Corns.—Lime Water internally, *Ac. Acetic Glac.*, *Ac. Carbol.* Ac. Nitric, *Ac. Chromic.*, *Ac. Picric*, *Ac. Trichloracetic*, Arg. Nit., Carbonic, Acid Snow, *Collodium Callosum*, *Collod. Salicyl.*, *Collod. Salicyl. c. Ac. Lactic*, *Formalin*, Glyc. Papain, *Hydrarg. Nitras*, *Ol. Cinnam.*, *Iodi Linim. Paraform Collod.*, *Potassæ Liquor*, Radium, *Liquor Sodii Ethylat.*, Magnesium, also Zinc Ions, 'X' rays.

Water Purification.—*Antityphoid Tablets*, *Copper*, Iodine, Permanganates, *Potassium Iodate*, *Sodium Persulphate* and Acid Sulphate.

Wax in the Ears.—Ol. Amygd. then syringe or Hyd. Perox. or diluted c. equal vol. of Glycerin, syringing afterwards, Glyc. and Sod. Bic. Saturated Solution.

Whitlow.—Hydrog. Perox., Mang. Butyrate.

Whites.—*See* **Leucorrhœa.**

Whooping-Cough.—Ac. Benzoic and Benzoates, Ac. Carbolic, Ac. Hydrocyan. Dil., *Adrenalin*, *Allii Succus*, Alumen, Amyl Nitris, Apomorphine (minute doses), Atropine, Atropine Methyl Bromide, Belladonna (almost specific), Benzol, Bromides, Bromoform Ether injection into the buttock (children under 1 year 1 Cc.), Bryonia, *Caffeine Tri-iodide Pil.* (Billimoria), Calcis Aqua, Calc. Sulphid., Benzyl. Benzoate, Camphor Elixir, Camphora Monobrom., Chloral, Cocaine HCl. *(on the basis of one grain thrice daily for an adult)*, Codeine Jelly, Conium, Gelsemium, Glycaphorm, Grindelia, Hexamine, *Iodine* in small doses, Ipecac., *Koumiss*, Lobelia, Morphine, *Ol. Succini*, Oxygen inhalation, and with Alcohol, Ozonic Ether, *Papaverine*, Phenacetin, Phenazonum, Pot. Brom., Quinine, Rubidium-Ammonium Bromide, Senega, Sodii Benzoas, Stramonium, *Syrup Thymi*, and Ext. Liq., Syr. Pini Terp. Heroin, Tab. Formalin (to suck), Vaccine B. Bordet-Gengou and Compound Whooping Cough Vaccine, *Thymaglycin*, 10 m. doses for children diluted useful.

Inhalation of Acid. Fluoric., Argent Nit. 2% as Pigment, Ethyl Iodide Sterule, *Himrod's Cure*, *Hyoscyamus*, Lactic Ac. B. Powder (Lacteol) as insufflation, *Pigment. Cocaine et Hyd. Perchlor.*, *Succini Ol. as Liniment*, *Vapor Coninæ*, *Fumigate room with Tricresol or Sulphurous Acid*, *Resorcin as Nebula*, Trichloracetic Acid, Vapor and Liniment Terebeni.

Ferric Chloride, solution of 240 grains in one ounce of glycerin and water applied to the root of the tongue preferably to Trichloracetic Acid.—T. Mark Hovell, B.M.J. i./17,284.

Croton Oil 1 ounce, Cantharidin 3 grains, Strong Acetic Acid 1 drachm, Almond Oil to 8 ounces painted weekly back and front for whooping cough. Aborts within 14 days.—W. J. Midelton.

Whooping Cough well treated with full doses of Carbolic Acid, Belladonna and Ipecac. with 1 m. a day for each year of child's age of Adrenalin Solution. —B.M.J. ii./21,224.

A mixed vaccine usually beneficial. Small dose of Belladonna, Bromide, and, if severe, Morphine and Antipyrin. In later stages, where there is no bronchitis, Benzyl Benzoate.—T. Izod Bennett, L. i./23,198.

Worms (Intestinal):—

Ankylostoma Duodenale (*Hookworm*). *See Ankylostomiasis.*

Ascarides (*Threadworms*).—Acid Carbolic 2 grains ½ hour *ante cib.* and Ung. Hyd. to rectum for a few nights. *Alum. Subacet.*, *Carbon Tetrachlor.*, Chenopodium Oil, *Enemata Aloes*, *Sodium Chloride*, *Salicylic Acid*, *Thymaglycin*, *Thymol or Quassia*, Quassia Suppositories. **Filix Mas has cured.**

Chloroform 3 to 4 Gm. kills the parent organisms and prevents development of ova. May well be combined with *Castor Oil* or Olive Oil. Effective against ascarides, as also against *Ankylostoma*, *Oxiurides*, and *Tricocephalus*.

Acute ascariasis associated with trichuris trichiuria (whip worm). Santonin and Salol effectual.—C. Russell Corfield and B. Hirson, L. i./22,995.

Methyl Salicylate possesses well marked anthelmintic properties (Hookworm). Most of the worms expelled dead, though it does not remove Ascaris or Trichuris—no after-effects. Salicylic Acid and Salol ineffective.—J. F. Caius and K. S. M. Lasker, per T.D.B. 19/22,662.

Ascaris lumbricoides infection and Strongyloidosis treated with Santonin or Oil of Chenopodium.—N. Cantlie, Jl. Trop. Med., Feb. 1/23,42.

Lumbrici (Round Worms).—Areca, Calomel, *Chenopodium*, Jalap, Naphthalene, Santonin (with garlic draught), *Spigelia*, Conf. Santonin Comp., Turpentine.

Tænia (Tapeworm).—Calomel, Cousso, *Embelia Ribes*, *Filicic Acid*, Filix Mas, Kamala, Oleum Terebinth c. Ol. Ricini, Pelletierine, *Pepo*, Thymol, Terebene.

Parasitic intestinal worms—prevalence of during the war. The commonest were *A. lumbricoides* and *Trichuris trichiuria* but the tapeworm *Hymenolepis nana* also occurred. Latter is common in S. Europe and U.S.A. A vast literature has accumulated on the subject.—W. Nicoll, L. ii./22,1049.

Trichuris trichiuria effectively treated with Thymol or Oil of Chenopodium.—N. Cantlie, Jl. Trop. Med., Feb. 1/23,42.

Propenyl Phenols have well marked anthelmintic properties. Substances containing free Phenolic Hydroxyl act both as vermicides and vermifuges. Etherification weakens or destroys vermifugal power and occasionally modifies vermicidal action.—J. F. Caius and K. S. M. Laskar, Jl. Trop. Med., Feb. 1/23, 49.

Many of the above drugs may be prescribed as *Stearettes* or *Formagules*, *q.v.*

For recent work on parasites with Carbon Tetrachlor., see p. 818.

Wounds.—Allantoin, Aseptafilm (applied as covering), Brilliant Green, Chloramine-T., Collodions, Cyanide Paste, Dakin's Solution, Eusol, Formalised Gelatin, *Glucose Powdered locally*, Hydrogen Peroxide, Iodine Tincture, *Kelly's Paint*, Liq. Alum Acet., *Mastiche Benzol*, Petrolatum Iodi, Mercuric Chloride or Biniodide Lotion, *e.g.* from a "Solube" 1 in 2,000. Mercuric Chloride with Sod. Chlorid.—Bandages, Gauzes, Lints, Wools medicated with Boric Acid, Carbolic Acid, Iodoform, Mercuric Iodide, Mercuro Zinc Cyanide, Picric Acid, Thymol Iodide, etc.

See also Antiseptics. For *Skin Sterilisation.*—See Iodum and Sublimate pp. 476, 508, *et seq.*

Wounds in War.—We dealt fully with this matter in last Edn., p. 1015, *et seq.* The salient points are now incorporated in the body of the book.

"Back to Lister."—A discourse on antiseptic surgery. The only way of destroying Tetanus and Gas Gangrene organisms and to deal with Streptococci is to use the most potent and safest antiseptic—Sir Rickman R. Godlee, B.M.J. i./15,515.

LISTER'S STRONG ANTISEPTIC MIXTURE consisted of Carbolic Lotion 1 in 20 containing 1/500th part of Corrosive Sublimate. Employed successfully for washing out recesses of wounds.—Arthur Edmunds.

HYDRARGYRI ET ZINCI CYANIDUM. CYANIDE GAUZE.

'Quite good for visible clean wounds.'—A. Don, B.M.J. i./16,648.

Dry Cyanide Gauze also found excellent for 'suppurating abrasions, boils and skin affections.'

IODINE. Wounds in naval warfare are frequently septic owing to the circumstances. In the 'Tiger' routine practice was first to wash with soap and water. After removing all foreign matter to dehydrate by flooding with S.V.M. and then sponge with 10% dilution of Tincture of Iodine in Methylated Spirit and insert drainage tubes and then cover with gauze.—B.M.J. ii./16,598. Some say it is irritating, and that the pain continues for some time, but we do not think this is generally acknowledged.

Yaws.—Organic Arsenic Compounds, Bismuth Compounds injected.

Yellow Fever.—Serum of Convalescent Patients tried. *See* Vol. II.

Zoster.—*See* Herpes.

ANTIDOTES TO POISONS.

This list of Poisons and their Antidotes, briefly outlined (the majority being more fully described in the text), will be an aid to the practitioner, when called to a case of poisoning, in assisting to determine: (1) The poison, if unknown, by taking the possibilities of the case into account; (2) the appropriate immediate antidotal treatment.

Acetanilide.—*Emetics. Inhalation of Ether and Oxygen.—Stimulants, e.g. Brandy, Coffee, Strychnine.*

Acetylene.—*As* **Carbon Monoxide.**

Acid Carbolic—Saccharated Lime Water is best from the chemical stand point. *Magnesium Sulphate or Sodium Sulphate (latter in preference) ½ oz. in ½ pint or more of warm water is wrong theoretically. Soft stomach tube with utmost caution. Apomorphine as emetic, but it does not always 'act.' Egg White, Stimulants, Oil, Weak Iodine Tincture, within limits give same quantity of Tincture of Iodine as of Liquid Phenol taken, Saline transfusion.* *See p.* 16.

Acid Carbolic burns on skin, see **Burns** Therap. Index.

Acid Cresylic, *see* **Acid, Carbolic.**

Acid Hydrochlor—*Alkalis, Chalk, Carron Oil, Lime.*

Acid Hydrocyanic. *Symptoms*.—*Giddiness, staggering, insensibility, eyes fixed and glistening, pupils dilated, violent gasping for breath, panting respiration. The poison is readily eliminated by the breath so if life can be maintained for even half an hour recovery is almost certain. Inhalation is as dangerous as swallowing or even local application or dropping in the eye.*

Stimulants, Ammonia (inhale), Sal Volatile ad lib. If patient cannot swallow give brandy as enema or hypodermically. Alternate hot and cold douches, artificial respiration about 20 in the minute, stomach pump or, if time, Mustard Emetic, Atropine hypodermically, or 30 drops of Tinct. Bellad. per os, repeated. See also Potassium Cyanide.

Acid Nitric.—*As* **Acid Hydrochlor.**

Acid Oxalic.—The best is a mixture of Chalk (Whiting) and Saccharated Lime Water; subsequently stomach tube. Do *not* give Soda or other Alkali. —Barts. *Apomorphine, Castor Oil.*

Acid Phosphoric.—*As* **Acid Hydrochlor.**

Acid Sulphuric.—*Magnesia and other alkalis (Lime), Carron Oil.*

Aconite.—*Apomorphine, Stimulants, Amyl Nitrite, Atropine Sulph.* $\frac{1}{50}$ *grain hypod. Digitalis Tincture, 20 minims hypod.*

Aconite and Belladonna (*as Liniment*).—*Emetics, Stimulants freely. —if not retained, dilute and give per rectum.—Murrell.*

Æthyl Chlorid.—*Weak Ammonia Vapour. Hot flannels to heart. See also* p. 120, or proceed as under Chloroform, p. 300.

Alcoholism Acute.—*Empty stomach by syphon or stomach-pump or injection of* $\frac{1}{10}$ *grain apomorphine, wash out and fill with strong coffee, Amyl Nitrite Inhalation, heat to extremities, counter-irritation and injection of* $\frac{1}{10}$ *grain Strychnine.—Whitla Pract. Med. Powdered charcoal ad lib. in water is efficacious.—Murrell.*

Alcohol Methylic.—*Brandy, Strychnine, Coffee (rectal injections if acute).*

Alkalis Caustic.—*See* **Potash Caustic and Ammonia.**

Alkaloids.—*Emetics, Tannic Acid, Potass. Permanganate, Amyl Nitrite. See also alkaloid in question.*

Charcoal, a tablespoonful or larger doses frequently repeated, seems to have a special attraction for alkaloids; Animal charcoal is the best form.—Hale White. It should be given at once suspended in water and pumped out again. The absorption is almost instantaneous. Afterwards rinse out with water containing the ordinary antidote, and then a suspension of Charcoal and Magnesium Sulphate if a purge is not contraindicated. Has also been used in Phosphorus, Mercuric Chloride, Paris Green and Phloroglucin poisoning.

Ammonia.—*Vinegar well diluted, Lemon or Orange Juice, Acetic Acid. Tracheotomy may be necessary. Bronchitis kettle, Morphine.*

Amygdalæ Amaræ Oleum Essentiale *vide* **Acid Hydrocyanic.**

Aniline.—*Emetics, artificial respiration, fresh air, oxygen, bleeding or transfusion*

Antifebrin.—*See* **Acetanilide.**

Antimony Compounds.—Strong Tea or Tannin Solution (30 grains in warm water). Repeat as often as vomiting occurs. When this subsides give white of egg in milk or water. *Stimulants, Morphine when all symptoms subsided.*

Antipyrin.—*See* **Phenazone.**

Aqua Fortis.—*As* **Acid. Hydrochlor.**, *q.v.*

Arsenic.—*Emetics* (wash out stomach with warm water), *Antidotum Arsenici, p.* 192, *Liquor Ferri Dialysatus ad lib. or Magnesia ad lib.*

Atropine.—*Emetics, stimulants with Morphine or Pilocarpine,* ½ *grain repeated.*

Barium Chloride.—*Sodium Sulphate.*

Battery Fluids.—*See* **Acid Sulphuric.**

Battley's Solution.—*See* **Morphine.**

Belladonna.—*See* **Atropine.**

Benzol.—*Emetics, Artificial Respiration, Douche with alternately hot and cold water over chest from a height, Stimulants.*

Biniodide of Mercury.—*e.g., in Antiseptic Tablets taken in error.*—*See* **Hydrargyri et Potassii Iodidum.**

Blistering Fluids.—*As* **Cantharides.**

Bromine.—*See* **Chlorine.**

Butter of Antimony.—*Vide* **Antimony.**

Butyl-Chloral Hydrate.—*Emetics, Caffeine, Coffee, Atropine.*

Caffeine.—*Stomach tube, Emetics, Nitroglycerin, Apomorphine. Hypodermic Injection of Morphine* ½ *grain with Atropine* $\frac{1}{50}$ *grain.* *See also* p. 262.

Calabar Bean.—*See* **Physostigma.**

Camphor (*and Camphorated Oil*).—*Emetics, Stimulants, Caffeine injection.*

Cannabis.—*Stomach tube, Emetics, Stimulants, Artificial respiration.*

Cantharides.—*If seen early, Stomach tube. Emetics. If mucous membrane much blistered give White of Egg in barley water or thick gruel—no fat.*—*Barts. Morphine if much pain.*

Carbolic Acid.—*See* **Acid Carbolic.**

Carbon Monoxide and Dioxide.—*Artif. respiration, Oxygen, Stimulants.*

In Carbon Monoxide poisoning.—Bleeding has been recommended in all cases unless contraindicated by the general condition.

Caustic Potash, etc.—*See* **Potash.**

Chloral and Chloralamide.—*Keep patient awake, Strong Ammonia to nostrils, stomach tube or emetics at once followed by Amyl Nitrite, Coffee, Oxygen, Picrotoxin, Strychnine* $\frac{1}{25}$ *grain, repeated if necessary in* ½ *hour. Artificial Respiration on slightest sign of failure continued some hours if necessary.*

Chloral and Morphine (*Combined*).—*Stomach pump or emetic. Arouse patient, but not to walk about. Ammonia to nostrils, cold then warm douche to head and chest. Atropine* $\frac{1}{25}$ *gr. hypod. repeated. Strychnine* $\frac{1}{25}$ *gr. hypod. if Chloral symptoms predominate.*

Chlorine and OTHER IRRITANT GASES.—

ALCOHOL (*Whisky, Brandy, etc.*) *to be inhaled from a cloth soaked with it as with Ether in addition. We have found this good.*—*W.H.M.* SODIUM BICARBONATE *about* 10% *solution inhaled through a respirator better than alcohol per os.* OXYGEN *subcutaneously into loose tissue.*

OXYGEN *inhalation by passing a tube connected with a gas cylinder to the back of patient's mouth and opening and shutting the tap about* 15 *to* 16 *times a minute, but it may only cause further irritation. For the cardiac weakness* CAMPHORATED OIL *subcut.* EMETICS *have proved useful.* ½ *pint of* SALT AND WATER *or* 8 *grains of* COPPER SULPHATE *followed by large draughts of lukewarm water.* PILOCARPINE *should be injected to promote shedding of the epithelium—if this is not efficacious use* POTASSIUM IODIDE. *Simultaneously Morphine.*—*J. B. Berkart.* LIQUOR ATROP. SULPH. 9 *minims, Water to* 6 *ounces. Dose.*—½ *ounce. Removes tightness across chest.* WARM AQUEOUS VAPOUR *is a good sedative. Subsequently ordinary methods of treatment of acute bronchitis.* SODIUM HYPOSULPHITE *in respirator solution.* VENESECTION *advised.*—*Sir E. Sharpey Schafer.*

Fumes from **Explosives** *in mines, accidents from.*

In all cases first produce emesis (APOMORPHINE HYPOD.), *then stimulants,* AMMONIA *or preferably* PITUITRIN.—*L. G. Irvine, B.M.J. i.*/16,162.

Dichlor-ethyl-Sulphide (MUSTARD GAS, YPERITE) **Phosgene,** *and other gas poisonings.*—*B.M.J. ii.*/18,138.

The first mentioned, though usually called a gas, is in reality an oily liquid which rapidly soaks through clothing and causes intractable blisters most difficult to heal. The effect is a delaying one, and is more marked on moist surfaces, e.g. from perspiration at the axillæ and fork. We had occasions during the war to make preparations to be used to counteract effects—an OINTMENT OF CHLORINATED LIME *seemed best. Iodine Picric Acid and others were tried.*

Details of treatment of burns and chest affections caused by mustard gas.—L. i./19,471. Use Sod. Bicarb. Sol. 1% for eyes.

A sulphur compound allied to Mustard Gas, which produces acute œdema of the lungs when injected intravenously.—B.M.J. i./23,819.

In treatment of the painful lesions apply any soothing application and inject 1% Manganese Butyrate 1 to 2 Cc. intram. on 3 occasions at 4 days' interval.—J. E. R. McDonagh, Brit. Jl. Derm. and Syph., Feb., 1924.

Bromine.—*We have found Alcohol Inhalation good.—W.H.M. Note on symptoms and treatment with animal expts.* STRAMONIUM *fumes good.—W. L. Symes, B.M.J. ii.*/15,12.

Nitrogen Peroxide *and other gases.*—SODIUM CARBONATE 20% *solution useful.*

Dermatitis caused by powder from bombs dropped in London. In nearly every case the eruption started on the ninth day after contact.—J. H. Sequeira, B.M.J. i./17,894.

Chlorodyne.—*As* **Morphine,** *q.v.*

Chloroform Inhalation.—*Amyl Nitrite, Artificial respiration—see* p. 300. *Inversion of the body.*

Chloroform (*Swallowed*).—*Amyl Nitrite. Stomach tube or Emetic. Large draughts of water containing Sodium Carbonate, say* 1 *drachm in* 1 *pint. Lavage with warm oil, e.g., Olive, Almond, Sesame, then Saline transfusion.*

Coal Gas.—*As* **Carbon Monoxide.**

Cocaine.—*Stomach tube, Amyl Nitrite, Ether hypodermically* (5 *minims*). *Strychnine hypod.*

Codeine.—*As* **Morphine,** *q.v.*

Colchicum.—*Evacuate the stomach, Demulcents, White of Egg, Stimulants.*

Colocynth.—*Spirit of Camphor, Laudanum, Stimulants.*

Conium.—*Stomach tube, Emetics, Tannin, Stimulants and Artificial respiration.*

Copper Salts.—*Stomach tube, Emetic, White of Egg, Milk, hot fomentations to stomach.*

Corrosive Sublimate.—*See* **Hydrargyrum.**

Creosote.—*As* **Acid Carbolic,** *q.v.*

Curare.—*Artificial respiration, Stimulants freely—see text.*

Cyanides.—*See* **Acid Hydrocyanic and Potass. Cyanide.**

Digitalis.—*Emetics, Aconitine Nitrate* $\frac{1}{100}$ *grain hypod,—repeated in* $\frac{1}{2}$ *hour, or Atropine* $\frac{1}{200}$ *to* $\frac{1}{100}$ *grain hypodermically. Tannin, Camphor, Nitroglycerin, recumbent position.*

Dover's Powder.—*As* **Morphine,** *q.v.*

Emetics are:—Ipecacuanha in powder or wine. Emetine, Apomorphine ($\frac{1}{10}$ to $\frac{1}{4}$ grain hypodermically), strong Salt solution (tepid), Olive oil, Copper sulphate (2 to 8 grains), Tartar Emetic ($\frac{1}{2}$ to 1 grain), Mustard and Water.

Ergot.—*Stomach Tube, Emetics, Purgation with Castor Oil or Mag. Sulph., Tannin, Stimulants, e.g., Amyl Nitrite, Nitroglycerin* $\frac{1}{50}$ *gr. Patient to lie down.*

Exalgin.—*As* **Acetanilide.**

Foxglove.—*See* **Digitalis.**

Fungi.—*A large proportion of deaths are due to Amanita phalloides, which peels like a common mushroom, but has bulbous part at base of stem, also yellowish green colour at edges and white gills; it grows beneath trees; the poison is a toxalbumin—Phallin, not an alkaloid. Stomach pump and Emetics (Ipecac. 25 grains or Salt Solution), Castor Oil, Atropine and Belladonna, Brandy, Spirit of Chloroform, Sal Volatile, Morphine for the pain, and administer normal Saline. Potassium Permanganate has been suggested to decompose any Phallin left in the stomach.*

On no account give Tartar Emetic where there is contraction of jaw muscles, or in the case of children. Apomorphine $\frac{1}{3}$ gr. (or $\frac{1}{20}$ grain or less for child) may be preferable. Give any purgative (not senna or jalap). If delirium and convulsions set in ether or chloral may be necessary (the latter may also be given in Enemata). Finally for abdominal pain Morphine or opium, but always begin with an emetic.

Mushroom poisoning. Recurrence of symptoms after 8 months, though no mushrooms eaten in the interval. Case described.—Leader, Jl. Trop. Med., Mar. 15/23,94. See also Aug. 1/22,249.

Gases, *see* **Chlorine** also **Carbon Monoxide, Nitrous Oxide.**

Gelsemium.—*Emetics, Atropine or Strychnine hypodermically, also Nitroglycerin or Amyl Nitrite; Artificial respiration, Stimulants.*

Hydrargyrum (*Mercurial Salts*).—*Emetics, Apomorphine, White of one Egg for every 4 grs. of Perchloride (avoid excess), then Stomach tube or Emetics, Reduced Iron, Alcohol or Ether for collapse. (Carron Oil made with Cod Liver Oil was given on one occasion where 43½ grains had been taken.)* Charcoal, *cf.* Alkaloids. See also p. 472.

Hydrarg. Potass. Iodide (*Biniodide Antiseptic Tablets taken in error*).—*Olive Oil, Milk, White of Egg, Petroleum Emulsion, warm draughts.—See p.* 469.

Hyoscine.—*Emetics, Pilocarpine Injection.*

Hyoscyamus.—*Vide* **Atropine.**

Hypnotics.—*Vide* **Drugs in question.**

Iodum.—*Stomach tube, Emetics (Apomorphine), Starch, Saccharated Lime Solution, or Sodium Hyposulphite, Demulcents—finally Opiates.*

Jaborandi.—*Murrell says Atropine* $\frac{1}{50}$ *grain hypodermically or* 30 *minims of Tincture of Belladonna at once arrests symptoms.*

Laudanum.—*As* **Morphine,** *q.v.*

Lead.—*See* **Plumbum.**

Lunar Caustic.—*As* **Silver Nitrate.**

Lysol.—*See* **Acid Carbolic.**

Matches.—*As* **Phosphorus.**

Mercury.—*See* **Hydrargyrum.**

Monkshood.—*See* **Aconite.**

Morphine.—*Keep patient awake. Emetic first (Apomorphine* $\frac{1}{10}$ *grain,—vomiting is induced with difficulty) then stomach tube even if Morphine taken hypodermically. Wash out stomach with Potass. Permang.* 10 *grains in half a pint of Tepid Water (Morphine, injected subcutaneously is excreted into the stomach and then re-absorbed. Osler, Vol. I.). Saline Transfusion, Stimulants. Hot and cold Water poured on head alternately, drying in intervals. Ammonia to the nose, Strychnine, Atropine,* $\frac{1}{20}$ *grain hypodermically, or if not at hand* 30 *m. Belladonna Tincture for every grain of Morphine, artificial respiration or Oxygen if necessary.—Murrell. Carbo Animalis often repeated cf. Alkaloids.*

Mushrooms.—*See* **Fungi.**

Mustard Gas.—*See* **Chlorine.**

Nepenthe.—*See* **Morphine.**

Nickel.—Purgation.—*See Vol. II.*

Nicotine.—*See* **Plants, Unidentified.**

Nightshade.—*See* **Atropine.**

Nitrobenzol.—*See* **Oil of Mirbane.**

Nitrous Fumes.—*See* **Carbon Monoxide** and **Chlorine.**

Nitrous Oxide (*Dental*).—*Vide page* 158

Nux Vomica.—*See* **Strychnine.**

Oil of Mirbane.—*Copper Sulph.(2 to 8 grains), or other Emetics, Stimulants, Atropine, Artificial Respiration, Calomel, Bismuth.*

Oil of Vitriol.—*See* **Acid Sulphuric.**

Opium.—*See* **Morphine.**

Paraffin (Paraffin Oil of Commerce).—Stomach tube or Emetic.

Paraldehyde. *See* **Chloral.**

Paregoric.—*See* **Morphine.**

Paris Green.—*Charcoal, cf. Alkaloids.*

Petrol Poisoning.—*Fresh air and warmth. Camphor injections, Oxygen.*

Phenacetin.—*Stimulants: Brandy, Coffee, Strychnine.*

Phenazonum.—*Brandy, Ether, Strychnine, Oxygen.*

Phloroglucin.—*Charcoal; cf. Alkaloids.*

Phosgene.—*See* **Chlorine.**

Phosphorus.—*Oil of Turpentine has been recommended but not other oils. Potass. Permang. Solution* 1% *per os. Murrell advises* 3 *grains Copper Sulphate every five minutes until vomiting is induced. To be continued* 1 *grain every fifteen minutes with a little Morphine if rejected. Epsom Salts as purgative. Charcoal, cf. Alkaloids.*

Physcstigma.—*Emetics as Mustard, Zinc Sulphate, Apomorphine, Pot. Permang. by stomach tube, Atropine $\frac{1}{50}$ grain, or in bad cases Strychnine $\frac{1}{12}$ grain hypodermically, stimulants freely.*

Pilocarpine.—*See* **Jaborandi.**

Pit Gas.—*See* **Carbon Monoxide.**

Plants, Unidentified.—*Stomach tube, Emetics, Aperients, Treat symptoms, Artificial respiration.*

Plumbum.—*Emetics (Zinc Sulphate or Ipecacuanha) stomach tube, dilute Sulphuric Acid ½ drachm in water; Magnes. or Sodium Sulph., Poultices to abdomen; Morphine hypodermic. for pain. See also Plumbum in text.*

Potassium Bichromate.—*Emetics, Mag. Carb., Barley Water, Arrowroot or thick Gruel and stimulants.*

Potash, Caustic.—*Dilute Vegetable Acid, Fixed Oils.* **Not** *stomach tube.*

Potassium Chlorate.—*Stomach Tube, Emetics.*

Potassium Cyanide.—*Ferrous Sulphate Solution, large draughts, stomach tube, Emetics, Stimulants, Artificial respiration.*—*See also* **Acid Hydrocyanic.**

Martin's Antidote consists in formation in the gastro-intestine of Prussian Blue. Thus 30 Cc. of Ferrous Sulphate Solution 23% strength, 30 Cc. of Caustic Potash 5%, and 2 Gm. of Magnesia: the two former to be kept in sealed ampoules, to be mixed and taken immediately.—B.M.J. i./13,27]

Potassium Nitrate.—*Stomach tube or Emetics, Mucilaginous Drinks. White of Egg, Stimulants, Atropine if sign of heart failure.*

Ptomaines.—Finely powdered Charcoal is suggested as a suitable antidote after eating tainted or suspicious food (as under Fungi).

Rat Paste.—*See* **Phosphorus** *or* **Arsenic.**

Red Precipitate.—*As* **Hydrarg.** *Give White of Egg freely.*

Salt of Sorrel *or* **of Lemons.**—*See* **Acid Oxalic.**

Savin.—*See* **Plants, Unidentified.**

Scopolamine.—*See* **Hyoscine.**

Sewer Gas.—*See* **Carbon Monoxide.**

Sheep Dip.—(?) **Arsenic.**

Silver Nitrate.—*Common Salt in demulcent drink (avoid excess), White of Egg, Milk.*

Stings, Wasp, Bee, etc.—*Ammonia or any Alkaline Solution. See also Therap. Index,* BITES AND STINGS.

Stramonium.—*See* **Atropine.**

Strophanthus.—*After evacuation by emetics and Stomach Tube, Tannin and stimulants. Anæsthetics to relieve spasm.*

Strychnine.—*Stomach Tube, Emetics, Potass. Permang., Chloral, Amyl Nitrite. Charcoal ad lib. Acid Tannic, Potass. Brom. (½ ounce in water with 30 grains of Chloral Hydrate). Patient may be kept fully under Chloroform or Ether. Artificial respiration if possible (most important).*

Sublimate.—*See* **Hydrargyrum.**

Sulphonal.—*Emetics, Stomach Tube, Strong Coffee, Strychnine, Artificial respiration.* Patient to remain lying down.

Sulphuretted Hydrogen.—*Iodised Starch (5% Iodine rubbed into Starch with a little water and dried.)* Inhalation of Chlorine best.

Tetrachlorethane.—*See Jaundice, Vol. II.*

Tobacco.—*See* **Plants, Unidentified.**

Trional.—*See* **Sulphonal.**

Turpentine.—*Empty stomach by pump or tube or give emetics—Apomorphine if necessary, Mag. Sulph., Demulcent Drinks.*

Verdigris.—*See* **Copper.**

Vermilion.—*See* **Hydrargyrum.**

Vermin Killer.—*As* **Strychnine** *or* **Arsenic,** *q.v.*

Veronal.—*Empty stomach by pump and enemata. Coffee, Strychnine, Artificial respiration, later diuretics.* See also several recent abstracts of poisoning cases under Veronal, p. 792.

Weed Killer.—*See* **Arsenic.**

Weever and other **poison fish** cause intolerable pain. Trawlers should have permanganate lancets on board, Chlorinated Lime, also Gold Chloride injections relieve pain.—M. Evans, B.M.J. ii./21,200.

White Precipitate.—*See* **Hydrarg.** *White of Egg freely.*

Zinc Salts.—NOT *stomach tube. Milk and White of Egg, Olive or any innocuous Oil, Washing Soda.*

Electric Shock *as from Live Electric Wire,* also *Lightning Shock and burns. Separate from live wire by catching hold of clothing or by using a good thick layer of cloth (dry) or a newspaper. If necessary cut a live wire with long iron scissors in wood handles. For burns Boric compresses. Raise the head. Artificial respiration. See also Vol. II., Radiology Chapter.*

PROPORTIONAL DOSE TABLE ACCORDING TO AGE (*Gaubius*).

For an adult suppose the dose to be	1 or 60 grains.
Under 1 year will require	$\frac{1}{12}$ „ 5 „
„ 2 „ „	$\frac{1}{8}$ „ 8 „
„ 3 „ „	$\frac{1}{6}$ „ 10 „
„ 4 „ „	$\frac{1}{4}$ „ 15 „
„ 7 „ „	$\frac{1}{3}$ „ 20 „
„ 14 „ „	$\frac{1}{2}$ „ 30 „
„ 20 „ „	$\frac{2}{3}$ „ 40 „
21 to 60, the full dose, or	1 „ 60 „

Above this age, an inverse gradation must be observed.

Young's Formula.—For children under 12, add 12 to the age, and divide the age by the amount thus obtained; thus for 8 years $\frac{8}{8 + 12} = \frac{2}{5}$ of adult dose.

W. J. Dilling says Young's and Gaubius' methods are of little value and suggests the best formula after the 10th year is to multiply the adult dose by $\frac{\text{age} \times 5}{100}$ or by $\frac{\text{age.}}{20}$ This he found gave a curve which when plotted out coincides more closely than other systems with the curve obtained by plotting out the percentages of adult weight at ages obtained from birth to 21 years, which he considers is the average adult age. The new formula, he states, results in doses which correspond closely with those demanded—B.M.J. ii./12, 1177.

INTRAVENOUS DOSES.

The following are results of our experience, or have been collected from various authentic sources.

In general, intravenous injections call for great care, The dose must be small, freely diluted, in isotonic solution and slowly injected.

The therapy in respect of some of the chemicals is entirely new and we should welcome suggestions from clinicians to extend the information given.

Statements in some Medical Journals—especially foreign—as to the amounts of chemicals employed intravenously have sometimes amazed us. We have proceeded on the side of caution in giving limit doses.

We strongly recommend trying ½ or even ¼ doses at first, freely diluted, where the method of treatment is new.

CHEMICAL.	AMOUNT.	VOL. OF DILUENT.
Acaciæ Gummi	16 Gm. (or more)	250 Cc. (or more in proportion)
Acriflavine	0·2 Gm.	200 Cc.
Adrenalin	0·5 Cc. of 1 in 1,000 solution	Usually added to 250 or 500 Cc. Normal Saline—to be given within 20 to 40 mins.
Antimonii Oxidum	0·0006 Gm.—0·0012 Gm	1 to 2 Cc. of Glycerin and water
Antimonium Tartaratum (Antim. Pot. Tart.)	0·03—0·1 Gm.	3—10 Cc.
Antimonii et Sodii Tartras	0·03—0·1 Gm.	3—10 Cc.
Arsamin	0·01—0·05 Gm.	1 Cc.
Arsenobenzol	0·3 or 0·4 Gm.	300 Cc.
Bayer '205'	1 Gm.	10 Cc.
Caffeinæ Sodio-Benzoas	0·12 Gm.	5 Cc.
Calcii Chloridum	0·25 Gm. (Pres. Nov. '19)	5 Cc.
" Chaulmartin "	0·5—1 Cc.	
Cocainæ Hydrochloridum	Enormous dose necessary—not suited for use in man.	
Colloidal Copper	STRENGTH 1 in 2,000	0·5—1 Cc.
Colloidal Gold	STRENGTH 1 in 4,000	5 Cc.
Colloidal Mercury	STRENGTH 1 in 2,000	5 Cc.
Colloidal Platinum	STRENGTH 1 in 4,000	5 Cc.
Colloidal Selenium	STRENGTH 1 in 5,000	1 to 5 Cc.
Colloidal Silver	STRENGTH 1 in 2,000	5 Cc.
Digitalinum Pulverisatum Pvr.	0·0006 Gm. (1/100 grain)	10 Cc.
Digitoxin	0·00015 Gm. (1/400 grain)	10 Cc.
Emetinæ Hydrochloridum.	0·03—0·04 Gm. (Rogers)	5 Cc.
Eusol	50 Cc.	
Ferri Cacodylas	0·06 Gm.	5 Cc.
Galyl	0·3 Gm.	50 Cc.
Glucose	(in 5% solution)	500 Cc. or more
Hexamine	4 Gm.(B.M.J.E. i. 23,65, We have prepared 1½ Gm. in 10 Cc.)	10 Cc.
Hexamine with Sodium Iodide 1 Gm.	1·5 Gm.	20 Cc.
Hydrargyri Cyanidum	0·012 Gm. (1/5 grain) Many (female) patients could stand twice the amount.—J. E. Lane, L. ii. 21,796.	1·2 Cc.
Hydrargyri Iodidum (c. Sodii Iodid. *q.s.*)	0·005 Gm. (Larger quantities in less vol. have also been given)	5 Cc.

CHEMICAL.	AMOUNT.	VOL. OF DILUENT
Hydrargyri Oxycyanidum	0·005 Gm. (1/12 gr.) (0·012 Gm. *i.e.*, 1/5 gr. has also be	5 Cc. in 1·2 Cc. (20 minims) en given)
Hydrargyri Perchloridum	0·002 Gm. (1/32 grain) (Larger quantities in less	5 Cc. vol. have also been given)
Iodi TincturaMitis (Off.)	1·2 to 2 Cc. (We suggest less to try)	9 Cc. N. Saline (Baillie, L. i./19,423)
Locke's Solution ..	500 Cc.	more or less
Novarsenobenzol ..	0·6 Gm.	10 Cc.
	or	
	0·6 Gm.	120 Cc.
Orange Juice	10 Cc.	Neutralised with NaOH and diluted to 50 Cc.
Oleum Chaulmoograe ..	(See page 607), give Sod.	Chaulmoog. in pref.
Paraldehyde	5 to 15 Cc.	150 Cc.
Peptone	*Gradcd doses as follows*: 0·3, 0·5, 0·7, 0·9, 1·1, 1·3 Cc. and 4 doses of 1·5 Cc. (Further doses, 3 of 2 Cc., 3 of 2·5 Cc.)	5% Solution, neutralised (For asthma and allied affections)
Peptone	8—10 Cc. increased by 2 Cc. every other day until 18—20 Cc. given	10% Solution, neutralised. (For septicæmia)
Quinidinæ Hydrochloridum Acidum ..	0·3 Gm. to 0·6 Gm.	5 to 10 Cc.
Quininæ Hydrobromidum Acidum ..	0·5 Gm.	10 Cc.
Quininæ Hydrochloridum Acidum ..	0·25 to 0·6 Gm.	10 to 20 Cc
Ringer's Solution ..	500 Cc. (more or less)	
Saccharum	10·3% (isotonic)	
Silver Salvarsan ..	0·1 Gm.	10 Cc.
Sodii Bicarbonas ..	Coma has been treated with a litre of 3 to 5% solutions in portions. 1·35% is isotonic	
Sodii Cacodylas.. ..	0·05 Gm. (massive amounts, even 3 Gm. in 5 Cc. are mentioned in American literature)	1 Cc.
Sodii Chaulmoogras ..	0·03—0·06 Gm.	1 to 2 Cc.
Sodii Chloridum ..	0·9%	500 Cc. (more or less)
Sodii Cinnamas.. ..	0·1 Gm.	10 Cc.
Sodii Glycerophosphas	0·2 Gm. (increased)	5 Cc.
Sodii Iodidum	1 Gm. (Larger amounts in the same vol. are mentioned)	20 Cc.
Sodii Iodidum } .. **Sodii Salicylas** } ..	1 Gm. of each	20 Cc.
Sodii Morrhuas.. ..	0·06—0·12 Gm. (This to follow course of subcutaneous injections)	2 to 4 Cc.
Sodii Salicylas	1 Gm.	20 Cc.
Sodii Thiosulphas (Hyposulphis) . ..	0·3 to 0·6 Gm.	5 Cc.
Strophanthin	0·00075 Gm. (1/80 gr.) (U.S.P.)	10 Cc.
Sulfarsenol	0·06 Gm.	10 Cc. or more
Tryparsamide	3 Gm.	10 Cc.
Tylcalsin	0·5 to 1 Gm.	10 to 20 Cc.
Tylnatrin	0·5 to 1 Gm.	10 to 20 Cc.

INDEX & POSOLOGICAL TABLE.

THIS index supplies the name *in Latin* as far as possible and adult dose (if used internally) of most of the drugs and preparations described. The doses are based on personal experience, or are culled from the best authorities.

Official names are printed in *italics*.

For **Acids** look under the word **Acid.**

For **Salts,** *vide* **Latin name** of the **base.**

For **Effervescent Preparations,** see list under the word **Effervescent.**

Some items, *e.g.*, some Official Medicamenta and Pilulæ have **purposely no page**—*i.e.*, they are not further described in the book.

Customary CONTRACTIONS have been found necessary, *e.g.* the following:

Acid. or Ac. = Acidus,-a,-um, etc.
Alc. = Alcoholic.
Alk. = Alkalinus, etc.
Av. = Average (Dose).
Caps. = Capsula, etc.
C. = cum (with).
Co. = Compositus, etc. (or compound).
Conc. = Concentratus, etc.
Eff. = Effervescens, etc.
Emplast. = Emplastrum, etc.
Emuls. = Emulsio, etc.
Expt. = Expectorant.
Extr. = Extractum, etc.
Fluidextr. = Fluidextractum.
Glycerin = Glycerinum, etc.
Glyceroph. = Glycerophosphas, etc.
HBr. = Hydrobromidum, etc.
HCl. = Hydrochloridum, etc.
Hyd. = Hydrargyrum, etc.
Hyp. = Hypodermicus, etc.
Inf. = Infusum, etc.
Inj. = Injectio, etc.
Incr. = Increased.
Linim. = Linimentum, etc.
Liq. = Liquor or Liquidus, etc.
Mag. = Magnesium, etc.
Mang. = Manganesium, etc.
Mist. = Mistura, etc.
Potass. = Potassium, etc.
Quin. = Quinina, etc.
Rad. = Radix, etc.
Rep. = Repeated.
Salicyl. = Salicylas, etc.
Sol. = Solutio, etc.
Spirit. = Spiritus, etc.
Strych. = Strychnina, etc.
Syr. = Syrupus, etc.
Tinct. = Tinctura, etc.
Ung. = Unguentum, etc. or Ointment.
Vin. = Vinum, etc.
'85 = B.P. 1885.

Vide also List of Abbreviations at commencement of the book.

NAME.	DOSE.	PAGE
A. B. C. Liniment	.. ..	109
,, Lotion	.. ..	109
,, Powder	.. ..	12
Abbey's Salt	.... ..	Vol. II.
Abbreviations	.. ..	xxv *et seq.*
Abdominal Dressings	.. ..	450
Abies Canadensis	.. ..	850
Abrus Precatorius; Abrin	..	804
Absinthe	.. .. ..	804
Acaciæ Cortex	.. .. ..	804
,, *Gummi*	.. .. ..	1
Acacia Gum Injection, Intravenous	.. .. ..	1
A.C.E.	.. .. ..	299, 302
Accessory Food Factors, *see* also Vitamins		589
Accouchement Sheets, Sphagnum	.. ..	760
Aceite de Palo (Ph. Notes)= Copaiba	.. .. ..	623
Acetaldehyde	.. .. ..	133
Acetamide	.. .. ..	8
Acetanilide, 2 to 5 gr.	..3 & Vol. II.	
and Me.-blue tubes	.. Vol. II.	
Acetannin, 5 to 15 gr.	..	107
Acetate d'Ammonium Dissous.		161
Acetic Anhydride	.. ..	6
Acetic Ether, 45 to 60 m.; 15 to 30 m. rep.	.. .. ..	119
Acetomorphine	.. ..	559
Acetone, 60–90 m. daily	4 & Vol. II.	
,, Bacillus	.. ..	5
,, Chloroform, 1 to 5 m.	..	297
,, Soap	.. .. ..	738
Acetonitril	.. .. Vol. II.	
Aceto-p.-amido-salol(Salophen)		101
Aceto-phenone, 1½–5 m.	..	5
Acetopyrin, 8 to 15 gr.	..	335
Acetosal	.. .. ..	86
Acet-phenetidin, 5–15 gr.	..	332
Acetum	.. ..	6
,, Digitalis, Ph. Ned.	..	408
,, *Cantharidini*	.. ..	282
,, Cantharidis	.. ..	282
,, Cevadillæ	.. ..	865
,, Ipecac., B.P. '98, 5 to 30 m.	.. ..	
,, Opii., 1 in 10, 8 m.	..	—
,, *Scillæ*, 5–15 m.	..	857
,, *Urgineæ*, 5–15 m.	..	864
Acetyl-benzoyl-aconine	..	110
,, Brom Salol, 5 gr.	..	100
,, chloride	.. ..	6
,, choline	.. .. Vol. II.	
,, Iodo-Salol, 5 gr.	..	100
,, *Morphine HCl.* $\frac{1}{25}$ to $\frac{1}{8}$ gr., 559; base, $\frac{1}{24}$ to $\frac{1}{12}$ gr.	.. .. ..	559
,, -p.-amido-salol, 10 to 15 gr.		101
,, -Methyl-Salicyl, 10 to 30 gr.	.. ..	93
,, -Salol, 15 gr.	.. ..	96
Acetylation process for oils	Vol. II.	
Acetylene	.. .. ..	306
,, Dichloride	.. ..	306

NAME.	DOSE.	PAGE
Acetysal	.. .. ..	86
Ache des Marais	.. ..	182
Achorion Schönleinii	.. Vol. II.	
Acid-fast Bacteria	.. Vol. II.	
Acidin, 5 to 15 grains	.. ..	1013
Acidol, 1 to 8 gr.	.. ..	7
Acidosis	.. .. .. Vol. II.	
Acid. Acetic., 33%, 5–15 m.	5 & V. II.	
,, *Acetic. Dil.*, 5%, ½ to 1 dr.		5
,, *Acetic Glaciale*	.. ..	5
,, Acetyl Aminohydroxphenyl. Arsonic	..	530
,, Acetyl-amino-Phenyl-stibinic	.. .. ..	181
,, Acetyl-Bromo-Salicylic, 5 gr.	.. .. ..	97
,, Acetyl-Iodo-Salicylic, 5 gr.	.. .. ..	96
,, *Acetyl-Salicyl.*, 5 to 15 gr.	86 & Vol. II.	
,, Acetyl-Coumar, 5 to 10 gr.		31
,, Agaric., ⅙ to ½ gr.	..	808
,, Amido-acetic, 10 to 30 gr.	6 & Vol. II.	
,, Amido-Succinic-Amide, 1–2 gr.	.. ..	814
,, Aminic., 2 to 10 m.	..	39
,, Aminophenylarsonic	..	201
,, Anacardic	.. ..	811
,, Aniline-arsenic	.. ..	201
,, Anisicum	.. ..	11
,, Arsanilic	.. .. ..	201
,, Arsenic., 1/64 to 1/12 gr.		195
,, *Arsenios.*, 1/64 to 1/16 gr.		190
,, Arsenoic	.. .. ..	198
,, Arsinic, Arsonic	.. ..	197
,, Aspartic	.. .. Vol. II.	
,, Auro-chloric	.. ..	234
,, Barbituric & Comps.	..	790
,, Benzamido-acetic	..	10
,, *Benzoicum*, 5 to 15 gr.	8 & V. II.	
,, *Boricum*, 5 to 15 gr.	11 & V. II.	
,, ,, Detection of, in Milk	Vol. II.	
,, Boro-Salicyl.	.. ..	12
,, Butyric.	.. .. ..	66
,, Cacodylic., ½ to 2 gr.	198 & V. II.	
,, Camphoric, 10–20 gr.	..	279
,, Carbamic	.. .. Vol. II.	
,, Carbazotic, ⅓ to 2 gr.	..	74
,, *Carbolic.*, 1 to 3 gr.	16 & V. II.	
,, ,, Camph.	..	18
,, ,, Commercial	..	33
,, ,, *Liq.*, 1 to 3 m.		18
,, ,, Liq. et Iodum		20
,, Carbonic	.. .. ..	25
,, Carminic	.. .. ..	819
,, Cathartic, 4 to 8 gr.	..	858
,, Chaulmoogric	.. ..	608
,, ,, 'C' Injn.	..	612
,, Chloracetic. (mono-, di, tri-,)		27
,, Cholalic	.. .. ..	757
,, *Chromic.*	.. .. ..	804
,, Chrysophanic., ⅙–½ gr.		307, 858
,, Cinnamic, 1/20–¼ gr.	..	28
,, *Citricum*, 5 to 20 gr.	33 & V. II.	

NAME.	DOSE.	PAGE
Acid. Coumaric	.. ..	30
,, *Cresylic.*,	1 to 3 m.	33 & Vol. II.
,, Desoxycholic	.. ..	757
,, Diacetic	.. ..	Vol. II.
,, Di-allyl-barbituric,	¾ to 4½ gr.	.. 795
,, Dicamphorylarsinic		Vol. II.
,, Di-chloracetic	.. ..	28
,, Diethylbarbituric	..	790
,, Di-iodo-elaidic	.. ..	513
,, Di-iodo-*p*-phenol.-sulphonic		501
,, Di-iodo-Taririnic	..	513
,, Dimeth.-arsinic.,	½ to 2 gr.	198
,, Dipropylbarbituric	..	794
,, Filicic,	6 to 15 gr. ..	434
,, Fluoric	.. .. ..	804
,, Formic.,	2–10 m.. ..	39
,, Fuchsin	.. ..	Vol. II.
,, Gallic.,	5 to 15 gr. ..	804
,, Glutarminic	..	Vol. II.
,, Glycerophosph.,	5 to 10 m.	41
,, Glycuronic	..	Vol. II.
,, Gynocardic,	½–3 gr. ..	612
,, Hippuric.,	5–20 gr. 10 &	Vol. II.
,, *Hydriodic.*	(10%), 5 to 10 m.	512
,, Hydrobrom.,	Conc. ..	48
,, ,,	*Dil.*, 15 to 60 m...	48
,, Hydro-Ferro-Cyanic		Vol. II.
,, *Hydrochloricum*,	31·79%, 2–6 m. 48 &	Vol. II.
,, ,,	*Dil.*, 10%, 5 to 20 m.	49
,, *Hydrocyanic. Dil.*,	2%, 2–6 m. 50 &	Vol. II.
,, ,,	(Scheele), 1 to 3 m...	50
,, Hydrofluoric. Dil.,	5–15 m. et Conc. ..	804, 805
,, Hydroxy-cinnamic.	..	30
,, Hydroxy-succinic.,	1 to 5 gr. ..	805 & Vol. II.
,, Hyperosmic.,	1/64 gr. ..	805
,, Hypochloros.	.. ..	51
,, Hypophosphoros.	..	677
,, ,,	Dil., av. 8 m. ..	677
,, Iodic.,	1 to 5 gr... ..	64
,, Iodo-behenic	.. ..	513
,, Iodophenol Sulph.	..	501
,, Kinic.,	4 to 8 gr... ..	710
,, *Lactic.*,	75%, 15 to 30 m.	65 & Vol. II.
,, Lactic. Dil.,	30 to 120 m.	66
,, Lactic Bacilli	..69 &	Vol. II.
,, Magenta	.. ..	Vol. II.
,, Malic.,	1 to 5 gr... ..	805
,, Malonic	.. .. ..	790
,, Margosic	.. .. ..	814
,, Meconic	.. .. ..	805
,, Metaphosph.	863 &	Vol. II.
,, Meta-vanadic.	.. ..	864
,, Molybdic...	..	Vol. II.
,, Monochloracetic.	..	27
,, Mucic	.. .. ..	839
,, *Nitric.*,	70%, 1 to 4 m...	72
,, ,,	*Dil.*, 10%, 5 to 20 m.	72

NAME.	DOSE.	PAGE
Acid. Nitric Fumans	.. ..	73
,, Nitro-hydrochlor. Fort...		73
,, Nucleic	.. .. ..	863
,, Nucleinic. (Sol.),	15 m.	293, 863
,, Nucleotinphosphoric	..	966
,, *Oleic.* (Caps.,	7½ m. 551)..	601
,, Ortho-coumaric	.. ..	30
,, Osmic., sol.	1%, 2 to 10 m.	805
,, Oxalic.	.. ..73 &	Vol. II.
,, Oxy-benzoic.,	5 to 20 gr.	77
,, Oxybutyric	..	Vol. II.
,, p. Oxyphenyl-amido-acetic		7
,, Oxyphenyl-arsonic	..	205
,, Perboric	.. .. ..	14
,, Phenol-sulphonic	22 &	Vol. II.
,, Phenyl-acrylic.,	1/20 to ¼ gr.	28
,, Phenylcinchoninic,	av. 8 gr. (See also Tabs. Phenoquin).	328
,, ,,	Ethyl-barbituric ..	795
,, ,,	Quinolin-carbonic .	327
,, *Phosphor. Conc.*,	66·30%, 1 to 4 m. 74 &	Vol. II.
,, ,,	*Dil.* 10%, 5 to 20 m.	74
,, Phospho-Molybdic.		Vol. II.
,, Phospho-tungstic		Vol. II.
,, Phthalic.	.. .. ..	11
,, Picramic	.. ..	Vol. II.
,, *Picric*,	¼ to 2 gr. 74 &	Vol. II.
,, Propylbarbituric	.. ..	794
,, *Prussic. Dil.*,	2–5 m. ..	50
,, Pyrogallic.	76 &	Vol. II.
,, ,,	Oxydat.	77
,, Pyrolignos. Crudum, and Rectif.	.. .. ..	6
,, Pyrophosph.	..	Vol. II.
,, Quinic.,	4 to 8 gr. ..	710
,, Ricinoleic.	.. ..	621
,, Rosolic	.. ..	Vol. II.
,, *Salicylic.*,	5 to 20 gr.	77 & Vol. II.
,, Salicyl-sulphonic.		Vol. II.
,, Santonic and Santoninic		736
,, Sclerotic.,	½–¾ gr.. ..	420
,, Silicic,	752; Sozolic. ..	22
,, Sphacelinic.	.. ..	418
,, Stearic.	.. .. ..	102
,, Succinic.,	5 to 10 gr. ..	103
,, Sulphanilic.,	5 to 10 gr...	321
,, Sulphocarbolic	.. ..	22
,, Sulpho-vanadic	..	Vol. II.
,, *Sulphuric.*,	95%, 1 to 2 m. 103 &	Vol. II.
,, ,,	*Aromat.*, 5 to 20 m. ..	103
,, ,,	*Dil.*, 10%, 5–20 m. ..	104
,, ,,	Fumans. ..	104
,, *Sulphuros.*,	30–60 m. ..	104
,, Sulphone-dichloramino-benzoic (Halazone)	..	63
,, *Tannic.*,	5 to 10 gr. ..	105
,, *Tartaric.*,	5–20 gr. ..	107
,, Telluric.	.. ..	Vol. II.
,, Thyminic,	5 to 10 gr. ..	966

NAME.	DOSE.	PAGE
Acid Trichloracetic	28 &	Vol. II.
,, Trichlorphenic	.. ..	24
,, Trinitrophenic	.. ..	74
,, Uricum and Estimation		V. II.
,, Valerianic, 1–5 m.	..	797
,, Vanadic., meta.	.. ..	864
Acids, Action of on Metals		Vol. II.
,, Fatty Unsaturated		601, 616, 619
,, Mineral, Sale of	.. ..	979
Acne, Bacteriology of	..	Vol. II.
,, Lotion	.. .. ..	853
,, Vaccine	.. .. ..	879
Acocanthera	.. .. ..	806
Aconite Leaves, *Root* and Preps.		107, 108 & Vol. II.
Aconitina, 1/600–1/200 gr.		110 & Vol. II.
Aconitinæ HBr.HCl., Nit. 1/600 gr. hyp.	.. ..	110
,, Oleat., 1 in 50	..	110
Aconitum— Laciniatum, 806; *Napellus*	..	110
Acorn (*vide* Aesculus)	.. ..	806
Acqua del Pagliari	.. ..	152
Acridine Compounds	313 &	Vol. II.
Acriflavine	.. .. ..	312
,, Antiseptic Power		314 & Vol. II.
,, Emulsion	.. ..	317
,, GonorrhœaTreatmen t		318
,, in Pyogenic Infections	.. ..	315
,, Intrav. Injection	..	316
,, Literature	.. ..	317
,, Neutral (Euflavine)		320
,, Patents and Mfre	..	313
,, Prophylactic Use	..	316
,, Soap Paste	.. ..	317
,, Spray	.. ..	318
,, Starch Poultices	..	318
,, Strengths for Use	..	316
,, Subcut. Injection	..	316
,, Therap. Coefft.	..	315
,, Therapeutic Uses	..	314
,, Wounds, Suppurating, and Prophylaxis	.. ..	316
Acrinyl Sulpho-Cyanide		Vol. II.
Acrosyl	.. ..	35
Actæa Racemosa	.. ..	823
Actinium	.. ..	Vol. II.
Actinomycosis	.. 699 &	Vol. II.
Activated Alkaloids	.. ..	141
,, Charcoal	.. ..	817
Actol, ⅛ gr.	.. .. ..	187
Acton on Quinidine, etc.	..	704
Adalin, sedative, 5 to 10 gr., hyp., 10 to 15 gr.	..	793
,, Characterisation		Vol. II.
,, Liberation of Br. from		98
Adams' Mercurial Injection	..	460
Adepsine Mulls	.. .. ..	563
Adeps and Adeps Benz.	..	806
,, Induratus	.. ..	806
Adeps Lanæ and Hydros.		111, 788
Adenin	.. .. ..	Vol. II.
Adnephrin	.. .. ..	960
Adonis Vernalis (Adonidin, ¼ to ½ gr.), 3 to 6 gr.	.. ..	806
Adonite	.. ..	806 & Vol. II.
Adormidera, F.E.=Papaver		..
Adrenalin, 958, 960; Distribution of, 958; Dilutions, 963; Chlor. Sol., 10 to 30 m., 960; in Chlorof. Anæsthesia, 961; with Eucaine, 351; Gauze, 964; Inhalant, 963; Intracardiac Injection, 962; Lamellæ, 964; Ointment, 964; References, 962; Sterules, 964; Styptic Gelatin, 964; Synthesis, 960; Suppos., 964; Tablets, 1/65 and 1/200 gr., 963; Tape, 964; Tests		Vol. II.
Adrenine	.. .. ..	960
Adrenol Solution	..	..963
Adsorption Comps.— Emetine	..	531 & Vol. II.
Ægle Marmelos	.. .. ..	815
Aerugo, 401; Aesculin	.. ..	806
Aesculus	.. ..	806
Æther, 45 to 60 m.; or 15 to 30 m. rep., 112; with Atropine, 115; in saline	.. ..	116
Æther Aceticus, 45 to 60 m.; or 15 to 30 m. rep.	.. ..	119
Æther Camphoratus	.. ..	277
,, Copal	.. .. ..	841
,, Dimethyl	.. ..	119
,, Methylat.	.. ..	113
,, Nit. Spirit	.. ..	118
,, Petrolei	.. .. ..	657
,, pro narcosi	.. ..	112
,, *Purificatus*, 10 to 30 m.		112
,, Purissimus	.. ..	112
,, Rectif.	.. .. ..	113
,, Spirit Camph.	.. ..	392
,, Sulphuricus	.. ..	112
Aethocaine	.. .. ..	353
Æthyl Bromidum	.. ..	807
,, Chloridum	.. ..	119
,, Iodidum	.. ..	121
Æthusa Cynapium	.. ..	807
Agar, 'Flaked' Almond, Vanilla, Raspberry, etc., flavoured 1 dr.	..	807
,, and Blood Agar Media		Vol. II.
Agaricus Albus, 10 to 30 gr.	..	807
Agaricin, ⅛ to ½ gr.	.. ..	808
Agaric, Surgeon's	.. ..	810
Agave Mexicana	.. ..	851
Ageratin	.. ..	962
Agglutinating Sera, Standard	..	V. II.
Agglutinins	.. .. ..	869
Aggressins	.. .. ..	871
Agmel, ½ oz.	.. .. ..	851
Agricultural Poisons	.. ..	190
Agrimony, 808; *Agropyrum*	..	808
Agurin, 10 to 15 gr.	.. ..	778

NAME.	DOSE.	PAGE
Air Liquid	.. ..	Vol. II.
,, Apparatus	.. .. ..	636
Aix-la-Chapelle Treatment	..	699
Airol, Airoform, Airogen	..	248
Ajenjo, F.E.=Absinthe.		
Ajowan	.. ..	782
Alabastrine	.. .. ..	566
Alabone's Treatment	.. ..	838
Albargin	.. ..	189
Alanine	.. .. ..	Vol. II.
Alastrim	.. ..	937
Albo-carbon	.. .. ..	566
Albumin Ovi siccum	.. ..	578
,, Sanguinis	.. ..	578
,, Tannicum, P. Jap.	..	106
,, Tests	.. ..	Vol. II
,, Water	.. .. ..	578
Albuminuria	.. ..	Vol. II.
Albumoses	.. 665 &	Vol. II.
Alcaptonuria	.. ..	Vol. II.
Alchemilla Arvensis	.. ..	808
Alcohol, *Absolute*, 122; and Oxygen, 636; Dilution Tables, Vol. II.; Allyl, 128; Ammoniatum, 162; *Amylic*, 128; Caprylic, Vol. II.; *Diluted*, 122 *et seq.*; for burns, 126; Duty, Current, 123; Duty free, 130; Injections, 125; Mastichi, 841; Methylic, 30 to 60 m., 128 & Vol. II.; Prohibition, 126; Propyl *n.*, 131; Sandarachi	.. ..	682
Alcohol, Industrial	.. ..	129
Alcool Camphré	.. ..	277
Alcoholism, Gold in	.. 380,	1006
Alcoolat Mélisse Comp., 20 to 25 drops	.. ..	842
,, de Fioraventi	.. ..	688
Alcoolature d'aconit	.. ..	108
Alcoolatures Stabilisées.	797,	806
Alcresta Ipecac. Tabs. *a.a.*=10 grains Ipecac	.. ..	531
Aldehydum Absol. et Dil.	..	133
,, Formicum 134 &		Vol. II.
Alder, (Black)	.. .. ..	830
Alembroth Preps.	.. ..	477
Aletris Cordial, ½ to 1 dr.	..	808
Aletris Farinosa	.. ..	808
Alginoid Iron, 2 to 15 gr.	..	808
Algodon, F.E.=Gossypium.		
Alibour Water	.. .. ..	402
Alizarin Monosulphate	..	Vol. II.
Alkagen Tabs., 1 to 3	.. ..	539
Alkali Bismuthyl Tartrates	..	250
Alkali Blue	.. ..	Vol. II.
Alkaline Meth. Blue	..	Vol. II.
Alkaloids, Activated	.. ..	141
,, Incompat. c. Sod.Bic		142
,, Detection of		Vol. II.
Alkaloidal Bases, Solubilities of		143
,, Notes	.. ..	141
,, Oils	.. .. ..	621
,, Mercuric Iodides	..	149
,, Periodides	.. ..	146

NAME.	DOSE.	PAGE
Alkanet, 811; Alkannin	..	812
Alkaptonuria	.. ..	Vol. II.
Alkarsin	.. .. ..	198
Allantoin and Dressing.	..	862
Allen's Dietetic Treatment	..	1023
Allen's Fehling Test	..	Vol. II.
Allium, ½ to 2 dr.	.. ..	808
,, Cepa	.. .. ..	810
,, Porrium	.. ..	810
Allocain S.	.. .. ..	355
Allonal, 1 to 2 Tabs.	.. ..	794
Allspice	.. .. ..	849
Allyl Alcohol	.. ..	128, 739
,, Isosulphocyanide 739 &		Vol. II.
,, Sulphide, ½ to 2 m.	..	809
,, Sulphocarbamide	..	739
,, Thio-urea	.. .. ..	739
Almizcle, F.E.=Moschus.		
Almond, Bitter	.. ..	163, 164
Alnus Glutinosa	.. ..	810
Alocol Tabs	.. .. ..	154
Aloe, 2 to 5 gr.	.. .. ..	149
,, Cape	.. .. ..	149
Aloin, ½ to 2 gr. (¼ gr. = 1 gr. ext.)	.. .. .. =	150
Alopon, ⅛ to ⅓ gr.	.. ..	632
Alpha Naphthol, 2 to 5 gr.	..	564
Alsol	.. ..	153
Alstonia	.. ..	810
Althæa, 810; Althein, 1 to 2 gr.		814
Alum. Ammon. vel Potass., 5 to 10 gr.	.. ..	151
Alumen, U.S.=Potash Alum	..	151
Alum Carmine	.. .. ..	819
,, Exsicc.	.. .. ..	151
,, Iron, 3 to 10 gr.	.. ..	433
,, Ust.	.. ..	151
Aluminii Acetas Neut. and Basic		152
,, Aceto-Tart.	.. ..	153
,, Chloras	.. ..	153
,, Chlor., 2 to 4 gr.	..	153
,, Formas	.. ..	153
,, Hydroxidum 153, 371,		376
,, Naphthol-Sulphonas		154
,, Silicas	.. .. ..	154
,, Sulphas	.. ..	152
,, Tannas	.. ..	106
,, Trisulph.	.. ..	152
Aluminium, soldering of	..	154
Aluminium vessels	.. ..	154
Alumnole, 154; Alum Points 151,		803
Alypin and Nitras, 1/20 to ½ gr.		352
Amaas	.. ..	937
Amadou	.. ..	810
Amani Institute.	.. ..	309
Amalgam Hg.	.. .. ..	463
Amanita Phalloides, *see* Fungi Antidote Chapter.		
Amanita Muscaria	.. ..	808
Amapola, F.E.=Flos Papaveris		
Amatol	.. .. ..	Vol. II.
Amber, Amber Oil	.. ..	861
Ambergris	.. .. ..	810
Amboceptors	.. 869 &	Vol. II.
Ambrine	.. ..	653

NAME.	DOSE.	PAGE
American Indian Hemp	..	182
Amido-acet.-p-phenetidin HCl.		333
Amido-acids	.. 6, 7 &	Vol. II.
Amido-azo-Toluol	.. ..	327
Amido-phenol (*p.*)	..	Vol. II.
Amido-Succinic Acid Amide	..	814
Amidol, V. II.; Hair Dye		Vol. II.
Amidopyrin, 5 to 8 gr., 335; and Comps.	.. .. ..	336
Amidopyrin Aceto-Sal., 5 to 10 gr.		337
,, Barbiturate	..	337
,, allyl-prop-barbiturate	..	794
Amino Acids	.. 6, 7 &	Vol. II.
,, Arseno-phenol	.. ..	204
,, -azo-benzene-betanaphthol		332
,, Benzoic Ethyl Ester	..	355
Aminobenz.	.. .. ..	352
Aminoform, 5 to 15 gr.	..	456
Aminophenol (p.)	..	Vol. II.
Amino-Phenylarsonic Toluene Sulphonate	.. .. ..	222
Aminothiobenzene	.. ..	772
Ammonal	.. ..	Vol. II.
Ammonia, Cloudy, Household		160
Ammoniated Quinine, ½ to 1 dr.		726
Ammonia Liquida	.. ..	160
Ammoniacum, 5 to 15 gr.	..	—
Ammon. Acetas, 10 to 30 gr.	..	161
,, *Benzoas*, 5 to 15 gr.	..	9
,, Bicarb., 3 to 10 gr.	..	157
,, *Bromid.*, 5 to 30 gr.	156 &	Vol. II.
,, *Carb.*, 3 to 10 gr.	..	157
,, *Chlorid.*, 5 to 20 gr.	..	157
,, Citras, 30 to 60 gr.	..	161
,, Cupri Sulph.	.. ..	402
,, Cyanas	.. ..	789
,, Fluorid., 1/24 to ⅛ gr.		805
,, Hippuras, 5 to 10 gr.		11
,, Hypophosph., 1 to 6 gr.		677
,, Iodidum, av. 5 gr.	..	158
,, Mercuric Chloride	..	477
,, Molybdate	..	Vol. II.
,, Nitras	.. .. ..	158
,, Persulphas	..	Vol. II.
,, Phosphas., 5 to 20 gr.		—
,, Picras., ⅛ to ⅓ gr.	..	76
,, Salicylas, 5 to 30 gr.	..	81
,, Succinas, 2 to 5 gr.	..	103
,, Rhodanid (Sulphocyanid.)	..	Vol. II.
,, Sulphas	.. ..	159
,, Sulpho-Molybdate		Vol. II.
,, Sulpho-Ichthyolas, 10 to 30 gr. daily	..	494
,, Tartras	.. ..	162
,, Valer., 1 to 8 gr.	..	159
Ammonol and Salicyl., 5 gr.	..	4
Amœba buccalis	..	519, 906
,, coli	.. ..	Vol. II.
,, histolytica, 517 *et seq.*	&	Vol. II.
Amœbic Dysentery, Emetine in		516
Ampere, *see* Iontophoresis		Vol. II.
Amphotropin, 8 to 12 gr.	..	459

NAME.	DOSE.	PAGE
Amydricaine	.. .. ..	352
Amygdala Amara; Dulcis	163,	164
Amygdalin	.. .. ..	163
Amyl Acetate	.. ..	Vol. II.
,, Alcohol, 128; Tertiary	..	810
,, Colloid	.. .. ..	364
,, Hydride	.. .. ..	658
,, *Nitris*, 1–5 m., Hyp. ½–1 m. by mouth, 2–5 m. inhaled	164 &	Vol. II.
,, Nitrite Sterules, 1, 2, 3, 4, 5, 6, 10 m.	..	165
,, Nitrite and Pilocarpine Hair Lotion	.. ..	169
,, Salicyl.	.. .. ..	79
,, Valerianate, 2–5 m.	..	798
Amylase	.. ..	637
Amylene	.. ..	810
Amylene-Chloral, 5 to 50 m.	..	811
Amyleni Hydras (Caps. 10 m.), 30 to 80 m., 811; Carbamate		811
Amylocaine	.. .. ..	356
Amylopsin and Injection	..	637
Amylum, 811; Amysal	..	79
Anacardium	.. .. ..	811
Anacyclus Pyrethrum	.. ..	852
Anæmia *v.* Therap. Ind.		
Anæsthesia by Chloroform	..	298
,, ,, Cocaine Ionisation		V. II.
Anæsthesia by Cocaine Infiltration	.. ..	349
Anæsthesia by Cocaine Lumbar puncture	.. .. ..	350
Anæsthesia by Ether, and with Oxygen and Alc., and with Oxygen and Gas, 114; Oil of Orange, in 115; Ether and Saline, 116; Intramuscular 116; Intratracheal, 117; Pharyngeal, 117; Oral, 118; Rectal	.. ..	117
Anæsthesia by Eucaine Infiltration	.. ..	351
Anæsthesia by Novocain, Intra-arterial	.. .. ..	353
Anæsthesia by Novocain-Suprarenin Infiltration	.. ..	353
Anæsthesia by Scopolamine Morphine	.. .. ..	490
Anæsthesia, Oil-Ether	.. ..	117
Anæsthesia Spinal by Mag. Sulph.	.. ..	541
Anæsthesia by Tropacocaine	..	350
Anæsthesia by Stovaine	356 *et seq.*	
Anæsthesia by Urea Quinine	..	717
Anæsthesine, 3 to 8 gr.	.. ..	355
Anæsthetics (General, Local—*v.* Therap. Index).		
Anæsthol	.. .. ..	303
Analgésine, 5 to 15 gr.	.. ..	333
Analysis of Patent Medicines		Vol. II.
Anamirta Paniculata	.. ..	849
Ananassa Sativa	.. ..	811
Anaphylaxis, *see* Protein Therapy and	..	Vol. II.

NAME.	DOSE.	PAGE
Anaphylotoxin		898
Anarcotine, 1 to 3 gr.		566
Anasarcin Elix., 4 dr. also Tabs.		702
Anchusa		811
Anderson's Ointment		244
Andira Araroba		308
Anestile, 120; Anethol		812
Anesthone, 355; Cream & Tape		356
Angina		166
Anhalonium		812
Angostura		826
Aniline Dyes	312 *et seq.*	
Aniline (Aniline Oil)		320
Cocaine, 320; Gentian Violet, Vol. II.; Iodoform, 320; Red, 328; Sulphate, ½–3 gr.		320
Animal Organotherapy	944 & V. II.	
,, Membrane		944
Aniodol, 139; Anions	Vol. II.	
Anise Fruit and Preps.		812
,, Oil		812
Ankylostomiasis 434, 614, 783, 818, 822, 848, 1008 & Vol. II.		
Annatto and substitute.	Vol. II.	
Anoci-Association		491
Anodyne Colloid		364
,, Tincture		632
Anopheles 723 *et seq.*	Vol. II.	
Anserine Mulls		562
,, Thiosinamin		740
Antexema	Vol. II.	
Anthelmintics, 434; *see* also Worms, Therap. Ind.		
Anthemidis Flores		812
Anthemis Cotula.		812
Anthoxanthum Odorat.		812
Anthraquinone bodies	291, 858	
Anthrarobin		322
Anthrax Serum		880
,, Bacillus	Vol. II.	
,, Inf. Shaving Brushes		881
,, Treatment of Wool		881
Antibacterial sera	869 *et seq.*	
Antibodies		869
Anticatarrh Salts		21
Antidotes, *see* The Poison in question and		1063
Antidotum Arsenici, ½ oz. every 5 or 10 minutes		192
Antifat	Vol. II.	
Antifebrin, 2 to 5 gr.		3
Antiformin	Vol. II.	
Antigen		869
Antilusin		927
Antilytic Serum		927
Antim. Arsenas, 1/100 gr. inc.		169
,, Chloridum	Vol. II.	
,, Nig. Purif.		170
,, *Oxidum*, 1 to 2 gr.		170
,, ,, Injections		170
,, Pentasulphid.		170
,, Pot. Tart.		174
,, ,, in C. S. Fever		888
,, Sodii Tart., ½ gr. intrav. increased		178
Antim Sulphuratum, 1 to 2 gr.		169
Antimon. Tartarat.		
{Diaphoret, 1/25 to 1/8 gr. / Emetic, ½ to 1 gr.		174
,, Triphenyl Sulphid		181
Antimony Butter	Vol. II.	
,, Colloidal	376, 387	
,, Comps., Organic 174 *et seq.*	Vol. II.	
,, Crocus		181
Antipyrin Aceto-Salicyl., 8 to 15 gr.		335
Antipon	Vol. II.	
Antiphlogistine		443
Antipyrine, 5 to 15 gr.		333
,, Coffeino-cit., 8 to 15 gr.		265
,, Salicyl., 15–30 gr.		336
Antirrhinum		808
Antiseptic Crédé		187
,, Inhalation	394, 395	
Antiseptics, Table of	Vol. II.	
,, Iontophoresis	Vol. II.	
,, Oils Essential as 600 &	Vol. II.	
,, Specificity of	Vol. II.	
Antisera, 873; Prepn. of		873
Anti-smoking Gum		852
Antitoxins		868
See also Disease or Organism and Vaccines.		
Antityphoid Tabs.		753
Antivenene	Vol. II.	
Antuitrin		953
Anturic Bath Salts	Vol. II.	
Aperfine, 2 to 4 dr.		655
,, Liquid, 2 to 4 dr.		655
Aperient Water		755
Aperitive Elixir, ½ to 1 dr.		150
Aperitol, 1½ to 6 gr.		673
Aperol		655
Aphrodine, *cf.* Yohimbine.		
Apiol Liq. (& Cryst.), 3 to 6 m., 181; and Ergotin Caps., 182; White		181
Apis Mellifica		812
Apium Graveolens		182
,, Petroselinum		181
Aplopappus		835
Apocodein, HCl., 1/10 to 1 gr.		362
Apocynamarin		182
Apocynum		182
Apomorphinæ HCl., $\frac{1}{10}$ to ¼ gr. by mouth; 1-20 to 1-10 gr. hypoderm.		182
Aponal, 15 to 30 gr.		811
Apothesine		359
Appendicitis, *see* Therap. Ind.		
Apple Essence, 798; Apricot Oil		163
Aq. Ammon. Fortior, U.S.		160
,, Ammon., U.S., 15 m.		160
,, Amygdalæ Amaræ		163
,, *Anethi*, ½ to 2 oz.		812
,, *Anisi*, ½ to 1 oz.		812
,, *Aurant. Flor.*, ½ to 2 dr.		232

NAME.	DOSE.	PAGE
Aq. Bromoformi, 1 to 4 oz.	..	259
,, *Camphoræ* (Conc. 184), ½ to 2 oz.	.. .. ..	277
,, Carminativa	.. ..	825
,, *Carui*, ½ to 2 oz.	.. ..	—
,, *Chlorof.*, ½ to 2 oz.	.. ..	303
,, *Cinnamomi* Conc.	.. ..	184
,, Coloniensis *v.* Eau de Cologne.		
,, Creosoti, 2 dr.	.. ..	393
,, Destillata	.. ..	Vol. II.
,, Dissocians, 2½ oz.	.. ..	755
,, Fluoroformi, 1 to 4 dr.	..	805
,, *Fœniculi*, ½ to 2 oz.	..	829
,, Formalinata.	.. ..	134
,, Hæmostatic (Alum)	..	152
,, Hamamelidis	.. ..	454
,, Hydrogenii Dioxidi, ½ to 2 dr.	.. .. ..	— 485
,, *Laurocerasi*, ½ to 2 dr.	..	163
,, Mellis	.. .. ..	127
,, *Menthæ Piperitæ*, ½ to 2 oz.		842
,, *Menthæ Viridis*, ½ to 2 oz.		—
,, Menthol	.. .. ..	550
,, Naphæ	.. .. ..	232
,, Picis, 5 to 10 oz.	..	312, 690
,, Pimentæ, B.P. '98, ½–2 oz.		—
,, Pruni Macroph.	.. ..	163
,, Ptychotis	.. .. ..	782
,, Regia	.. .. ..	73
,, *Rosæ*, 1 to 2 oz.	.. ..	—
,, Sambuci	.. .. ..	855
,, Saturnina = Liq. Plumbi Subac. Dil.		
,, Sedativa	.. .. ..	277
,, Zeozoni	.. .. ..	806
Aquæ Concentratæ	.. ..	184
Aquaperia Water	..	Vol. II.
Arabinose *v. B. typhosus*		Vol. II.
Arachis, 812; *Araroba*	.. ..	308
Arbor Vitæ, 864; Arbutin, 5 to 15 gr., 813; Benzoic-Ether	..	813
Archil	.. .. ..	Vol. II.
Arctium Lappa	.. ..	839
Arctostaphylos Uva Ursi	..	813
Areca, Arecoline and HBr.	..	813
Argein	.. .. ..	188
Argenti Acetas	.. .. ..	185
,, Citras (Itrol)	.. ..	187
,, Cyanidum $\frac{1}{64}$ to $\frac{1}{20}$ gr.		185
,, Fluoridum	.. ..	187
,, Iodid. Recent	.. ..	185
,, Lactas (Actol), $\frac{1}{6}$ gr.	..	187
,, *Nitras*, ¼ to ½ gr.	185 &	V. II.
,, *Nitras*, Fusus	.. ..	187
,, *Nitras, Indurat. et Mitigat.*	.. ..	187
,, Nucleinas	.. ..	294
,, Oleas (¼ to ½ gr. ?)	..	604
,, Oxidum, ½ to 2 gr.	..	187
,, Proteinas	.. ..	188
Argentic Hair Dye	..	Vol. II.
Argentide	.. .. ..	185
Argentum Colloidale, ½ to 2 gr. (*See* also Colloids).		187
,, Collosol	.. ..	386
Argentum Crédé	.. ..	187
,, Proteinic	.. ..	188
Argyrol	.. ..	187
Arhéol, 3 m., 622; Arhovine (Caps.), 4 m.	.. ..	785
Ari Succus, 1 dr.,	.. ..	813
Aristochin (Aristoquinine), 1 to 10 gr.	.. ..	728
Aristol, 500; Aristolochia	..	859
Arithmetical Memoranda	..	xxxvi
Armoraciæ Radix	.. ..	824
Arnicæ Flores	.. .. ..	813
Aromatic Confection	.. ..	630
Aromatic Elixir, ½ to 2 dr.	..	413
Arrhénal, 2/5 to 3 gr.	.. ..	200
Arrow Poisons	.. ..	825, 847
Arrowroot	.. ..	787, 841
Arsamin, ¾ to 3 gr.	.. ..	201
,, Paste	.. ..	202
Arsenic Compounds Organic		197 & Vol. II.
,, Act	.. .. ..	981
,, Anilide	.. ..	201
,, Antidote, ½ oz. every 5 mins.	.. ..	192
,, Colloidal	..	371, 377
,, Eating	.. ..	Vol. II.
,, Horticultural Use	..	190
,, Preps. Indust. Dangers		V. II.
,, Tests	.. ..	Vol. II.
,, Wood Preservers		Vol. II.
Arsenic, White, 1/60 to 1/15 gr.		190
Arsenical Cigarettes	.. ..	197
,, Fibre, 194; Paste	..	194
Arsenii Bromidum, 1/60 to 1/12 gr.	.. .. ..	193
,, *Iodidum*, 1/20 to 1/5 gr.		194
,, Trioxidum	.. ..	190
Arsenious Wool	.. .. ..	194
Arsenium, 190; dimethyl	..	198
Arsenobenzol	.. .. ..	204
Uses in syphilis	.. ..	206
Hereditary, 219; para-syphilis	.. .. ..	206
,, Other diseases	.. ..	207
,, After effects	.. ..	215
,, Antibody Theory.	..	214
,, Apparatus for Injns.		209, 210
,, Arsenic Retention		Vol. II.
,, Chemistry of Injns.	..	208
,, Commercial Samples		206, 215, 218
,, Contraindications	..	215
,, Copper Compound	..	220
,, Deaths under	.. ..	215
,, Doses	.. ..	208 *et seq.*
,, Doses, Fractional.	..	208
,, Doses, Interval between.		208
,, Dose, Maximum	.. ..	213
,, Estimation of Arsenic		Vol. II.
,, Examination for Spirochetes	.. ..	Vol. II.
,, Glucose with	..	213, 216
,, Injection Methods—Intramuscular	.. ..	210

NAME.	DOSE.	PAGE
Arsenobonzol Injection Methods—		
Subcutaneous	.. ..	211
Intravenous	.. ..	208
,, Jaundice	.. .. ..	215
,, Local Anæsthetics in	..	213
,, Local Use	.. .. ..	214
,, Manufacture	.. ..	205
,, Mercury, combined use	..	212
,, Neo	.. .. ..	217
,, Neurosyphilis	.. ..	214
,, Oily Suspensions of	210,	211
,, Patents, Details of	..	204
,, Preparation of Injn.	..	208
,, Rectal Use.	.. ..	211
,, Serum of patient used	..	214
,, Silver	.. .. ..	216
,, Sodium Formaldehyde Sulphoxylate	.. ..	217
,, Tests Physiological	218 &	Vol. II.
,, Trade Marks	.. ..	204
,, Warnings and contra-indications	.. ..	215
,, War Office Method	..	212
,, Wasserman's Reaction, Effect on	..	Vol. II.
Arsenobillon	.. .. ..	204
Arsenoic Bodies	.. ..	198
Arsenphenolamine	.. ..	204
Artemisia Maritima *et var.*	..	734
,, Absinth.	.. ..	804
Arterial Tension.	.. ..	573
Arthritis, Rheumatoid, 699; *B. Coli* in, 891; *see* also Therap. Index.		
Artificial Respiration	.. ..	158
Arum Maculatum	.. ..	813
Arylarsonates	.. .. ..	198
Asafetida; 5 to 15 gr.	.. ..	813
Asbestos	.. ..	155
Ascaris, 735; (and *see* Worms, Therap. Index).		
Asclepias, 814; Asepso Soap	..	737
Aseptafilm, 448; Aseptic Wax		821
Aseptol	.. ..	22
Asparagin, 1 to 2 gr.	.. ..	814
Asphyxiating Gas, poisoning by, *see* Chlorine.		1064
Aspidium (and oleo-resin)	..	434
Aspidospermine	.. ..	853
Aspirin, 5 to 15 gr.	.. ..	86
,, Hydrolysis of and Purity of	..	Vol. II.
Aspirinoids	.. .. ..	86
Aspriodine, 5 gr.	.. ..	96
,, Salts	.. ..	97
Asteriastigma	.. .. ..	606
Asthma Cigarettes	.. ..	701
,, Cure (Tucker's)		Vol. II.
,, Fluid Comp.	.. ..	227
,, Peptone Injn. for	..	665
,, Powders	.. ..	701
,, Sensitisation	.. 662	*et seq.*
,, Skin Tests	.. 662	*et seq.*
,, Vaccine	.. ..	881

NAME.	DOSE.	PAGE
Atomic Weights	..	xxxviii
Atophan, 30 to 45 gr.	.. ..	327
Atoxyl, $\frac{3}{4}$ to 3 gr.	.. ..	201
Atrinal	.. ..	633
Atropa Belladonna	.. 224,	235
Atrophic rhinitis, *see* Therap. Index.		
Atropina, 1/200 to 1/100 or 1/16 gr.	.. ..	224
Atropine Steriloids	.. ..	144
Atropinæ Methyl-Bromid., 1/64 to 1/32 gr.	.. ..	230
,, Oleatum	.. ..	229
,, Salicyl, 1/60 gr.	..	227
,, Sulph., 1/200 to 1/100 or 1/16 gr.	.. ..	227
Atropine, Typhoid Diagnosis	..	V. II.
,, Valerianas, 1/60 gr.	..	227
Atropine with Ether	.. ..	115
Atta	.. ..	595
Attar of Rose	.. 847 &	Vol. II.
Auld's Non-specific Protein Therapy.	.. .. ..	665
Aural Bougies	.. .. ..	233
Auramine.	.. 329 &	Vol. II.
Aurantii Cortex	.. .. ..	232
Auri Brom. 1/64 to 1/5 gr.	..	233
,, Chlor., 1/64 to 1/16 gr.	..	233
,, Cyanid, 1/60 to 1/12 gr.		Vol. II.
,, et Potassii Cyanid., 1/64 to 1/3 gr.	.. ..	234
,, et Sodii Chlor., 1/30 to 1/12 gr.	.. ..	234
,, Trichlor., 1/64 to 1/16 gr.		233
Auricular Fibrillation	.. ..	705
Aurin	.. .. ..	Vol. II.
Aurinaria	.. .. ..	233
,, Cocain. Hyd., 1/10 gr.		344
,, Hydrarg. Nit.	..	471
,, Scarlet	.. ..	326
Aurum	.. ..	233
Auto-inoculation	.. ..	876
Autunite	.. ..	Vol. II
Ava, Awa Root	.. .. ..	838
Avantine	.. .. ..	130
Avena Sativa, 814; Azadirachta, 814; Axungia	.. ..	806
Azafran, F.E. = Saffron.	..	
Azahar (Flores., F.E. = Aurantii Flores	.. .. ..	232
Azolitmin.	.. ..	Vol. II.
Azobenzol and comps.	.. ..	323
Azotite d'Amyle.	.. ..	165
Azur I. and II., Azur II.-Eosin.		V. II.
"B.E."	.. ..	922
B.M.R.	.. ..	973
Bacelli's Mixture, $\frac{1}{2}$ to 1 oz.	..	193
,, Tetanus Method	..	911
Bacilluria. *See* Bac. Coli Vaccine & Vol. II.		
Bacillus Abortus	..	Vol. II.
,, Ac. Butyrici	..	Vol. II.
,, ,, Lactici	.. ..	69
,, Acetone.	.. ..	5
,, Acne	.. 879 &	Vol. II.

NAME.	DOSE.	PAGE
Bacillus, Acidophilus	.. ..	71
,, Aerogenes Capsulatus		V. II.
,, Aertrycke	..	Vol. II.
,, Anthracis	880 &	Vol. II.
,, Bordet.	937 &	Vol. II.
,, 'Bottle'	879 &	Vol. II.
,, Botulinus	..	Vol. II.
,, Bouchard's	..	69, 71
,, Bulgaricus	..	69 *et seq.*
,, Caucasicus	69 *et seq.* &	V. II
,, Coli Communis	890 &	V. II.
in Urine and in Water.		*see* Vol. II.
,, Differences between & B. Typh.	..	Vol. II.
,, Diphtheriæ	891 *et seq.* &	V.II.
,, Doderlein	..	Vol. II.
,, Dysenteriæ	894 &	Vol. II.
,, Enteritidis	..	Vol. II.
,, Friedländer	884 &	Vol. II.
,, Fusiformis (Vincent's Angina)	..	960, 1060
,, Gartner's	..	Vol. II.
,, Gas Gangrene		Vol. II.
,, Glanders	..	Vol. II.
,, Glycobacter.	.. ..	70
,, Hoffman	..	Vol. II.
,, Influenzæ	883 &	Vol. II.
,, Klebs-Loffler	891 *et seq.* &	Vol. II.
,, Koch-Weeks	..	Vol. II.
,, Lepræ	.. ..	Vol. II.
,, Malignant Œdema		Vol. II.
,, Mallei	.. ..	Vol. II.
,, Mesentericus	..	Vol. II.
,, Morax-Axenfeld		Vol. II.
,, Œdematis Maligni		Vol. II.
,, Paratyphosus	929 &	Vol. II.
,, Pneumosintes	.. ..	902
,, Perfringens	..	Vol. II.
,, Pestis	.. ..	Vol. II.
,, Pfeiffer's	.. 899 &	Vol. II.
,, Pneumo, Friedlander	.	884
,, Proteus	..	Vol. II.
,, Pyocyaneus	.. ..	906
,, Rheumaticus	.. ..	906
,, Septus	. .. ..	883
,, Shiga's	.. 894 &	Vol. II.
,, Subtilis	. ..	Vol. II.
,, Tetani	. .. ..	910
,, Tuberculosis	914 &	Vol. II.
,, ,, Human & Bovine differences		Vol. II.
,, ,, in Fæces, Milk, Urine, etc.		Vol. II.
,, Vaginæ	. ..	Vol. II.
,, Vincent's Fusiform		906,1060
,, Typhi and P-typhi	929 *et seq.* &	Vol. II.
,, Typhi in Water		Vol. II.
,, Welchii	..	Vol. II.
,, Whooping Cough	937 &	V.II.
,, Xerosis	. ..	Vol. II.
Bacteria, Acid-fast	..	Vol. II.
,, Digestibility of	..	873
Bacteria, Parasites of	.. ..	873
,, Pathogenicity of	..	871
Bacterial Emulsions	.. ..	875
Bactericides. *See* 34 *et seq.* &		Vol.II.
Bacterins	.. ..	868 *et seq.*
Bacteriological Notes (*See* also Bacilli).	..	Vol. II.
Bacteriolysins	.. .. ..	869
Bacteriophages	.. ..	873
Bacterol, Varieties	.. ..	138
Baculum Chrysarobini	.. ..	307
,, Resorcini	.. ..	731
Badiane	.. ..	814
Bael Fruit	.. .. ..	815
Balmain's Paint	. ..	Vol. II.
Bain dit de Vichy	.. ..	747
Baines' Dielectric	..	Vol. II.
Baking Powders	..	Vol. II.
Balm	.. ..	842
Balmosa	.. ..	80
Balneum = about 25 gallons.		
,, Alk.St.M.'s, Sodii Carb. 6 ozs.–50 gals.		
,, Amyli, ½ lb.		
,, Bituminis	.. ..	312
,, Boracis, 2 ozs.		
,, Furfuris (Bran.), 4 lbs.		
,, Picis Carb.	.. ..	312
,, Potassæ Sulphuratæ	..	695
,, Salinum	.. ..	745
,, Sulphuris, 695; Alk.		755 & 772
Balsam Aniseed	. ..	Vol. II.
,, Canadense	..	Vol. II.
,, Copaibæ	.. ..	623
,, Fioraventi	.. ..	688
,, Gurjunæ, ½ to 2 dr.	..	814
,, Lanolinatum	.. ..	814
,, Locatelli	.. ..	688
,, *Peruv.*, 5 to 15 m.	..	814
,, *Tolut*, 5 to 15 gr.	..	815
,, Vitæ Hoffmanni, 1 to 4 dr.	.. .. ..	784
Bamber Oil	.. ..	Vol. II.
Banana Flour	.. .. ..	584
Bandages	.. 275, 284,	447, 477
,, Crinoline	..	275, 447
Banting on Insulin	.. ..	641
Baptisia (Baptisin, 1 to 5 gr.)	.	815
Barberry	. .. .	816
Barbitonum, 5 to 10 gr.	.. ..	790
Bardana	. .. .	839
Barii Acetas	.. .. ..	815
,, Carbonas	.. .. ..	235
,, Chloridum, ½ to 1½ gr.	..	815
,, Hypophosph. ¼ to 1 gr.	..	678
,, Nitras	.. .. ..	815
,, Oleas	.. .. ..	605
,, Peroxidum	. .. ..	485
,, Sulphas	.. .. ..	235
,, Sulphid., ½ to 1 gr.	..	234
,, ,, Depilatory	.. ..	234
,, Thiosulph.	.. ..	235
Barium Platino Cyanide Screens		Vol. II.

NAME.	DOSE.	PAGE
Barium Water	.. .. ..	815
Barker's Injn.	.. .. ..	356
Barley	.. ..	497
Barosma, *var.*	.. .. ..	260
Barr, Sir J., on Lime Salts	..	268
Barthelemy's Syringe	.. ..	461
Basal Metabolic Rate	.. ..	973
Basham's Mixture, av. 4 dr.	..	429
Basil	.. ..	846
Bassia, *var.*	.. .. ..	815
Bath Water	.. ..	Vol. II.
Baths : Nauheim and Salt		271, 753
,, Sod. Bisulph.	.. ..	753
Battiste	.. ..	447
Battley's Liq. Opii	.. ..	630
Baume Analgésique	.. ..	80
,, de Fioraventi	.. ..	688
,, de Vie=Dec Aloes Co.		—
,, Tranquille	.. ..	492
Bay Berries	.. .. ..	839
Bay Rum	.. .. ..	127
Bayer '205'	.. ..	222, 524
Bazin's Ointment	.. ..	481
Bearberry Leaves	.. ..	813
Bebeeru Bark	.. .. ..	815
Beberin HCl. and Sulph.	..	815
Becker's Solution	.. ..	52
Beck's Bismuth Paste	..	246
Bee Tincture	.. .. ..	812
Beech Tar	.. .. ..	691
Beecham's Pills	..	Vol. II.
Beechwood Creosote	.. ..	393
Beef, Dried Extracted	.. ..	577
,, Preps., 576; and Malt Wine	.. .. ..	577
,, Tea Conc.	.. ..	576
,, Peptone with Malt, 2 to 4 dr.	.. .. ..	662
,, Peptonised Jelly of		576, 640
Beet Sugar	.. .. ..	732
Belæ Fructus	.. .. ..	815
Beleno, F.E.=Hyoscyamus (leaves, seeds)	.. ..	—
Belladonna *Leaves*, 1 gr.		235 & V. II.
,, Fruit	..	Vol. II.
,, Indian	..	Vol. II.
,, Plasters	.. ..	236
,, *Root*, ¾ gr.		236 & Vol. II.
,, Assay, etc.	..	Vol. II.
Benedict's Tests (and Modifs)	..	V. II.
Benger's Food	.. .. ..	587
Bengue's Balsam	..	Vol. II.
Benné Oil	.. .. ..	625
Benzal Chloride	.. ..	323
Benzocaine, 3 to 8 gr.	..	355
Benzaldehyde, ½ m.	.. ..	163
,, Green	.. ..	329
Benzaldehyde-HCN	.. ..	163
Benzamido-Acetic Acid	..	10
Benzamine (HCl.) 1/10 to ½ gr.		350
Benzaminæ Lactas, ⅛ to ½ gr.		351
Benzene, 5 to 10 m.	.. ..	322
Benzidine, V. II. Benzine		322, 658
Benzoic Sulphimide	.. ..	732
Benzoin, Siam, Sumatra	..	8
Benzol, 5 to 10 m.	.. ..	322
,, Capsules, 5, 10, 15 m.		322
,, Chloride	.. ..	323
Benzol - azo - Benzol - azo - *B*-Naphthol	.. .. ..	326
Benzo-Mastiche	.. ..	841
Benzoline	.. ..	322, 657
Benzonapthhol, 4 to 10 gr.	..	564
,, Varnish	..	683
Benzo-Piperaz., 2 to 5 gr.	..	689
Benzo-purpurin	..	Vol. II.
Benzosol, 4 to 12 gr.	.. ..	398
Benzosulphinidum	.. ..	732
Benzoyl-Chloride	..	323, 499
,, -Ethyl-dimethyl-amino propinol HCl.	..	356
,, -Glycocoll	..	10 & Vol. II.
,, -Hydrate, 5 to 15 gr.	..	8
,, -Naphthol, 4 to 10 gr.	..	564
,, -Peroxide	.. ..	10
,, -Pseudo-Tropine	..	350
,, -Salicin	.. ..	850
,, -Sulphonic-Imide	..	732
,, -Tetrameth-di-amino-eth.-di-meth.-carbinol		352
Benzyl Acetate	.. ..	325
,, Alcohol	.. ..	323
,, Aceto Salicyl	.. ..	325
,, Benzoate, 2to6m. (diluted)		324
,, Carbinol	.. ..	325
,, Chloride	..	323 & V. II.
,, Cinnamate	.. ..	325
,, di-chloride	.. ..	323
,, Mandelate	.. ..	325
,, Succinate	.. ..	325
Benzylidene Chloride	.. ..	323
Berberinæ Carb., HCl., Phosph., Sulph., 2 to 6 gr.	.. ..	816
Berberis var.	.. .. ..	816
Bergamot, V.II.; Beri Beri		590, 848 & Vol. II.
Berkfeld Filter	.. ..	Vol. II.
Berlece's Solution	.. ..	1011
Berna Milk	.. .. ..	584
Bernsteinsäure (Ac. Succinic)		103
Besredka's on Vaccines *per os*		871, 933, 934
Besredka's Sensitised Vaccines		938
Betacaine, 1/10 to ½ gr.	..	350
Betaine HCl., 1 to 8 gr.	..	7
Beta Vulgaris	.. .. ..	7
,, -Eucaine, HCl., 350; Lact. ⅛ to ½ gr.	.. ..	351
Beta-Naphthol, 3 to 10 gr.		563 & V. II.
,, Naphthol Benzoas, 4 to 10 gr.	..	564
,, ,, Salicyl	..	565
Betel, 813, 816; Betol, 3 to 8 gr.		565
Bettendorf's Reagent		Vol. II.
Betula Alb.	.. .. ..	691
Betula lenta, 77; Betulol	..	80
Bhang	.. ..	280
Beibrich Scarlet	.. ..	326
Bikh	.. ..	806
Bilberrry	.. .. ..	844

NAME.	DOSE.	PAGE
Bile Beans, V. II.; Bile Salts V. II.		
Bile Tests	.. ..	Vol. II.
Bilharzia (and Therap Ind.)		176, 476, 520
Billroth's Cambric	.. ..	447
Bilsenkraut=Hyoscyamus	..	493
Bin de Vichy	.. .. ..	747
Biniodide Lotion, Solubes and other preps.	467 *et seq.*	
,, Soap	.. ..	737
'B.I.P.P.'	.. .. ..	246
Bi-quinyl	.. .. ..	256
Birch Tar, 691; Birch, Sweet.		77
Bird Lime (Japanese)	.. ..	866
Bisedia, 1 dr., 242; Bish	..	806
Biscinoid, ⅛ to 1 gr.	.. ..	243
Biscuit Foods	.. .. ..	582
Bishop's Method	.. ..	629
Bismarck Brown	..	Vol. II.
Bismosal, ½ to 1 dr.	.. ..	242
Bismuth	.. ..	240 *et seq.*
Bismuth Agaricinas	.. ..	808
,, Alkali Tartrates	..	250
,, Benzoas, 5 to 20 gr.		240
,, *b*-naphtholas	..	250
,, Carbolas	.. ..	250
,, *Carb.*, 5 to 20 gr.	..	240
,, Cinch.Iodid., ⅛ to 1 gr.		243
,, Citras, 2 to 5 gr.	..	242
,, ,, Gauze	.. ..	242
,, Colloidal	.. ..	371
,, et Ammon. Citr., 2 to 5 gr.	.. ..	241
,, et Cerii Salicyl., 5 to 20 gr.	.. ..	245
,, Emetine Iodide	..	520
,, Gallas, 8 gr.	..	249
,, Hydroxyd. 5 to 20 gr.		255
,, Meals	240, 244,	245
,, Mucilago	.. ..	244
,, Nitras Cryst., 5 to 10 gr.	.. .. ..	244
,, Nucleinas, 20 to 40 gr.		294
,, Oleas, 5 to 10 gr.	..	605
,, Organic Comps of		250
,, Oxide hydrated	..	255
,, Oxidum, 5 to 20 gr.		244
,, Oxybenzoas	.. ..	240
,, Oxybrom, 5 to 7 gr.		244
,, Oxycarb., 5 to 20 gr.		240
,, Oxychlor, 5 to 20 gr.		244
,, Oxyiodid., 5 to 10 gr.		245
,, Oxyiodogallas	..	248
,, *Oxynitras*, 5 to 20 gr.		246
,, *Oxysalicyl*, 5 to 20 gr.		245
,, Pancreatin, 1 to 2 dr.		243
,, Paraffin Emulsion, 1 oz. *mane*	.. ..	655
,, ,, Injection	..	248
,, Paste (Beck's)	..	248
,, Phenas, 10 to 30 gr.		250
,, Pot. et Sod. Tart;	..	252
,, Sterules	.. ..	254
,, Potass Tartrates	..	252
,, Pyrogallas, 2 to 8 gr.		250
Bismuth Salicylas, 5 to 20 gr.		245
,, Sod. et Pot Tart;	..	252
,, Sterules	.. ..	254
,, Sod Tart *Neut.*	..	251
,, Sod Tart *Acid* 2 to 5 gr.	.. .. ..	252
,, Subcarb., 5 to 20 gr.		240
,, Subgallas, 8 gr.	..	249
,, Subiodas	.. ..	65
,, *Subnitras*, 5 to 20 gr.		246 & Vol. II.
,, Subsalicyl, 5 to 20 gr., 245; Basic	..	245
,, Sulphocarb., 4 to 8 gr.		245
,, Tannas, 10 to 30 gr.		250
,, Tartas Solub., 2 to 5 gr.	.. .. ..	252
,, Tart (True)	.. ..	255
,, Test Meals	..	240,244
,, Tribromphenas, 5 to 20 gr.	.. ..	23
Bismutol Sterules	.. ..	254
Bismuthyl	.. .. ..	254
Bismutose, 15 to 30 gr.	..	250
Bisurated Magnesia, ½ dr.	..	539
Bites, Insect	.. ..	... 1011
Bitter Apple, 2 to 8 gr.,	..	389
Bitter Bush	.. .. ..	822
Bitter Sweet	.. .. ..	859
Bitumarine	.. .. ..	312
Bitumen	.. ..	312
Black Draught, 1 to 2 ozs.	..	858
,, Haw	.. ..	485,866
,, Wash	.. .. ..	480
Blackberry, Norwegian	..	854
Black-water Fever	.. ..	724, 1012 & Vol. II.
Bladder Irrigators, 284; Wrack		830
Blair's Gout Pill	..	Vol. II.
Blair's Tooth Pdr.	.. ..	267
Blanc de Baleine	.. ..	821
Blanc de Perle	.. ..	244
Blastomycosis	.. ..	172 & V. II.
Bleaching Pdr.	.. .. ..	51
Blaud's Pill	.. .. ..	424
Blenosan	.. .. ..	625
Blepharis Cap., 816; Bliss' Cure		701
Blighia Sapida	.. ..	816
Blistering Fly		281 *et seq.*
Blood Agar	.. ..	Vol. II.
,, Benzidine Test for		Vol. II.
,, Coagulability of	..	267
,, Corpuscles Tests		Vol. II.
,, Lime Salts on	.. ..	268
,, Pressure	.. ..	573,702
,, Purifiers	.. .. ..	856
,, Root, 855; Serum (Loffler's)		Vol. II.
,, Staining	..	Vol. II.
,, Thymolphthalein Test		Vol. II.
,, Sugar Estimn.	..	Vol. II.
,, Testing of all kinds		Vol. II.
,, Transfusion	.. ..	975
Blue Alkali, Aniline	..	Vol. II.
,, Gum Tree (Eucalypt.)		613

NAME. DOSE.	PAGE
Blue Methylene, 1 to 4 gr. ..	331
,, Nicholson's V. II.; Opal, V. II.; Night, 331; Patent A, 331; Spirit, Vol.II.; Water Soluble	V.II.
,, Unction, 462; Pill ..	461
Boas' Test, V. II.; Bogbean 842; Bog Moss	758
BodyVermin.*see* N.C.I.,Vermijelli, Lefroy's Emulsion, also Parasites	1047
Boeck's Lotion	692
Bohadschia Aphrodisiaca ..	826
Boldoa Fragans, Boldine ..	816
Boletus Laricis, 10–30 gr. ..	807
Bolus Alba	154
Bonduc Nut	816
Bone Marrow Extract, Red ..	944
Bon Voyage ½ oz., 48; Tabs. .	48
Bonner & Browning's Violet and Green	330
Boracite, 60 grs., 14; Borage	497,862
Borated Hydrogen Peroxide ..	487
Borax, 5 to 20 gr.	14
Borax Carmine ..	Vol. II.
Bordeaux Bx.	326
Bordet-Gengou Reaction (Gono) (Syph.); (Tuberc.) and (Typh.)	Vol. II.
Boric Acid and Starch Powder and with Zinc, 801, as preservative	Vol. II.
Bordet's Vaccine	937
Boric Cream	13
,, Vaseline	13
Borneol Salicyl	79
Borneol-isovalerianate ..	798
Bornyl Acetate ..	Vol. II.
Boroglyceride and Pessary ..	12
Boron	Vol. II.
Borovertin, 15 to 60 gr. ..	457
Borrel's Blue, ..	Vol. II.
Botany Bay Kino, 5 to 20 gr. ..	828
Botulims Antitoxin	1013
Botulism	1013
Bouchard's Remedy	49
BOUGIES, 256, 284; Aural ..	233
Nasal, 257; 'X' Ray ..	V. II.
,, **URETHRAL GELATIN**, 2½ and 4 in. (dip in warm water)	256
,, Argent. Proteinate, ½ grain	189
,, Bellad, Alc. Ext., 1½ gr.	
,, Cocaine, ½ gr.	
,, Cotarnine HCl., ½ gr. ..	567
,, Ext. Krameriæ, 1 gr.	
,, Leistikow's	189
,, Neisser's	189
,, Opium, 1 and 2 gr.	
,, Silver Nitrate, ¼ gr.	
,, Stypticin, ½ gr. to ⅔ gr.	
,, Thalline, 1 gr. and 2 gr.	
,, Zinc Acet., Chlor. and Sulph.	

NAME. DOSE.	PAGE
BOUGIES ¼,½ and 1 gr.etc. Bellad Ext.	
,, 1½ gr. et c. Ext. Opii., 1 gr.	
,, Zinc Sulphocarbolate, ½ gr.	
,, **URETHRAL WITH CACAO BUTTER** (dip in Catheter, Oil)	257
,, Bellad., Ext. Rad., ¼ gr.	
,, Bismuth Oxychlor., 5, 10 gr. and c, Lead Acet, 1 gr.	
,, Cocaina, ½ gr.	341
,, Copper Oleate, 5 gr. ..	602
,, Cotarnine, HCl., ½ gr. ..	567
,, Eucalyptus Oil, 10 m. ..	
,, Iodoform, 3 and 5 gr.	
,, Eucalyptus Oil, 10 m. .. }	499
,, Iodoform, 5 grs. .. }	
,, Lead Acetate, ½ gr., ¾ gr. and 1 gr.	
,, Neisser's	189
,, Opium, 1 and 2 gr.	
,, Silver Nitrate, ½ gr. ..	187
,, Stypticin, ½ gr.	567
,, Tannic Acid, 1 gr., and with Opium, 1 gr. ..	
,, Zinc Chlor. and Sulph., ¼ to 1 gr.	
,, Zinc Permang ½ gr. ..	549
Bouleau Huile de, ...	691
Bovril	756
Bow's Liniment. ..	Vol. II.
Brain Extract	945
Brand's Meat Juice	576
,, Nutrient Pdr.	578
Brandish's Solution	695
Brandy and Sterules ..	127 & V. II.
Brass Oil	403
Brass Paste	403
,, ,, Picric	403
Brassica var.	738
Braxy	Vol. II.
Bread, Potato Starch in	Vol. II.
,, Ropiness of ..	Vol. II.
,, Standardisation	Vol. II.
,, Starchless	588
Brea, F.E.=Pix.	
Breast Feeding ..	578, 579
Bredig's Process	373
Brilliant-Green ..	329 &V.II.
,, Ointments ..	330
Broadbent's Mixture ½ oz. ..	726
Brom-Albumen, 10 grs. ..	258
Bromal Hydrate, 2 to 5 gr. ..	257
Bromalin, Br.-ethylformine, 5 to 30 gr.	258
Brometone, 5 gr.	259
Bromides	257
Bromidia, ½ to 1 dr.	296
Bromine, Capsules of ..	Vol. II.
,, in Org. Comps., liberation of	98
,, Paraffin	510
Brominol (10%), ¼ oz.=20 gr. Pot. Brom. ..	258
,, (33%), 10–60 gr. ..	258
,, Mixture, ½ oz. ..	258

NAME. DOSE.	PAGE
Bromocarpin, 1 dr.–1 oz. acc. to age	533
Bromodiethyl-Acetyl-Urea ..	793
Bromoform, ½ to 2 m. . ..	259
Brom-iso-valerianyl-urea	794 & V.II.
Bromol, ½ to 2 gr.	22
Bromo-protein, 10 gr. ..	258
Bromphenobis, 5 to 20 gr. ..	23
,, Gauze	24
Brompton Blacks	832
Brompton Cough Specific	Vol. II.
Bromum	257
Bromural, 5 to 10 gr.	794 & Vol. II.
,, Tablets, 5 gr. ..	794
Bronamalt, 1 to 2 dr. ..	544
Bronchial Asthma, Peptone in	665
Bronchial Glands	948
Bronchitis, Vaccines in .. (*See also* Therap. Ind.).	882
Brook's Ointment	603
Broom	757
Broth, Nutrient ..	Vol. II.
Brownian Movement	368
Browning on Acriflavine	317 *et seq.*
,, Brill. Green ..	330
Brown's Bronch. Troches	..V. II.
Brucea Sumatrana	816
Brucine and Salts, 1–12 to ½ gr.	816
Brunton on Angina	165
Brunton's Snake Lancets ..	547
Bryant's Sherry	509
Bryone	836
Bryonia (*var*), 816; Black ..	863
Bubonic Plague ..	Vol. II.
Buchu, 260; Buckbean ..	842
Buckthorn	830
Budde	
Bufagin	Vol. II.
Buffers	Vol. II.
Buginaria.—Nasal Bougies, Elastic Gelatin, $3\frac{3}{16}$ in. long	257
Buginarium Ac. Borici, 5 gr.; Ac. Carbol., ½ gr. ..	257
,, Cocainæ HCl., ⅛ gr. ..	257
,, Cupri Sulph., 1-10 gr. and ⅛ gr.	257
,, Iodof., ⅛ gr. and ½ gr.	257
,, Zinci Sulph., 1-10 gr.	257
,, Aluminis, 1-10 gr. ..	257
,, Zinci Sulph., 1-10 gr.	257
Bugloss	827
Bugs to kill	.. 1047
Bulgarian Bacillus ..	69 *et seq.*
Bungpagga	..V. II.
Bunter's Nervine ..	Vol. II.
Burdock	839
Burgess' Oint. and Pills	Vol. II.
Burgi's Theory	561
Burgundy Pitch	690
Burnet, Great = Sanguisorba off. (*Rosaceæ*)	
Burney Yeo's Catarrh Mist., 161, Chlorine and Quinine Mixture, 1oz.	724
Burow's Solution	152

NAME. DOSE.	PAGE
Burri's Ink	Vol. II.
Burt's Fluid	.. 312
Busserole	.. 813
Butcher's Broom Tar .	.. 691
Buteœ Gummi, 838; *Semina*	.. 817
Butter Analysis ..	Vol. II.
,, of Antimony ..	Vol. II.
,, Nut	.. 837
,, of Orris	.. 836
Buttercloth	.. 447
Buttermilk	.. 72
Butyl-Choral Hyd., 5 to 20 gr.	260
Butyl-Eth-Malon-Urea	.. 794
Butyn	.. 359
Butyric Ether	.. 811
Buxine	.. 815
Bynin (et Amara), 2 to 4 dr.	.. 543
Bynol	Vol. II.
Byno-Lecithin, ½ oz. ..	.. 535
Bynoplasma, ½ oz. ..	.. 927
'C' Disinfecting Fluid	.. 35
Cacao and Cacao Butter	.. 778
C. B. Q. Tabs. and Lin.	Vol. II.
C. E.	.. 303
Cachets	.. 684
Cachets, Oxyquinotheine	.. 266
Cacodyle, 198; "New"	.. 200
Cacodyliacol, ½ to 2 gr.	.. 198
Cactus, 821; Cactina ..	.. 821
Cæsalpinia Bonducella ..	.. 816
Cadum	Vol. II.
Caffeina 1 to 5 gr.	.. 262 & V. II.
Caffeinæ *Citras*, 2 to 10 gr.	.. 263
,, *Eff.*, 1–2 dr.	.. 263
,, Di iodo-hyd.	.. 265
,, HBr .. ½ to 5 gr.	.. 263
,, HCl .. ½ to 5 gr.	.. 263
,, Hydriodid., ½ to 5 gr.	.. 263
,, Salicyl., 1 to 4 gr.	.. 264
,, Sodii Iodid., 2 to 10 gr.	265
,, Sodio-Benz., max. 45 gr. *p.d.*	264
,, Sodio-Salicyl., 1 to 5 gr.	264
,, Tri-Iodid., 2–4 gr. ..	265
,, Valer., ½ to 3 gr. ..	265
Caffeine-Chloral, 3 to 8 gr. hyp.	265
Cajuput, 817, Cajuputol ..	614
Calabar Bean 1 to 4 gr. ..	680
Calabaza F.E. = Cucurbita ..	
Calamina Præp.	801
Cal Apagado, = Calc. Hydras.	
Calcidin	273
Calcii Aceto Salicyl, 5 to 15 gr.	89
Calcii Bisulphis	Vol. II.
,, Bromid., 10–20 gr. ..	257
,, Cacodylas, ½ to 2 gr. ..	198
,, Carbide	Vol. II.
,, *Carb Præcip.*, 15 to 60 gr.	266
,, *Chloridum*, 5–15 gr. ..	267
as hæmostatic ..	268
,, Cyanamidum ..	Vol. II.
,, Dibromobehenate 15 to 45 gr.	513
,, Fluoridum, ¼ to ½ gr.	805

NAME.	DOSE.	PAGE
Calcii Formas	3 to 5 gr. ..	40
,, Glyceroph.,	3 to 10 gr...	42
,, ,, Solubilis ..	.. ..	43
,, Guiac-Sulphonat .	..	399
,, Hippuras,	5 to 20 gr. ..	11
,, *Hydras* ..	.. ..	274
,, Hydrid ..	.. Vol.	II.
,, Hypochlor (Chlorinat.)	.	51
,, *Hypoph.*,	3 to 10 gr. ..	678
,, Iodas and Preps.,	3 to 4 gr.	64
,, Iodidum (in dilute solution),	2–4 gr.	273
,, Iodobehenas ..	.. ..	513
,, Iodo-Ricinoleas,	3 gr. ..	622
,, *Lactas*,	10 to 30 gr. ..	66, 267 *et seq.*
,, Lactoph.,	3 to 10 gr. ..	68
,, Margosas..	.. ..	814
,, Monosaccharate..	..	274
,, Naphthol-sulphonas,	10 to 30 gr. ..	Vol. II.
,, Nitras ..	.. Vol.	II.
,, Oleas ..	.. ..	606
,, ,, Colloidal .	..	377
,, Permanganas ..	548 & Vol.	II.
,, Peroxid.,	3 to 10 gr. ..	273
,, *Phosph.*,	5 to 15 gr. ..	273
,, ,, Acidus,	5 to 20 gr.	274
,, ,, Di-Acid,	5 to 20 gr.	274
,, ,, Di-basic,	10 to 30 gr.	273
,, ,, Monoacid,	10 to 30 gr.	273
,, ,, Monobasic,	5 to 20 gr.	274
,, Saccharas,	8–30 gr. ..	274
,, Sulphas,	20–30 gr. ..	274
,, Sulphid.,	¼ to 1 gr. ..	275
,, Sulphis ..	.. Vol.	II.
,, Sulphurat. Sol. ..	..	275
,, Superoxidum ..	..	273
,, Tungstas..	.. Vol.	II.
Calcinol,	3 to 4 gr.	64
Calcium and the Blood.	..	267
,, Deficiency and Parathyroid	.. ..	974
,, Estimn. in Blood and Urine.	.. Vol.	II.
,, Hydride	.. Vol.	II.
Calculi ..	.. .. Vol.	II.
Calcusol	.. .. ..	689
Calendula	.. .. ..	817
Calf Lymph, Glycerinated, etc.		934
,, Purification	.. ..	936
Calisaya Bark,	10 to 60 gr.	308, 309
Californian Syrup of Figs	Vol.	II.
Calmette's Ophthalmic Reaction		929
Calomel,	½ to 5 gr.	478
,, Cream ..	.. ..	480
,, ,, Lambkin,	10 m.	460
,, Duret's..	478 & Vol.	II.
,, Ointment ..	..	480
Calorie Values of Food	Vol.	II.
Calorific Fluid ..	.. ..	344
,, Wool ..	.. ..	288
Calot's Creosoted Oil ..	..	657
Calotropis. Vol. II. Calox ..		273
Calumbæ Radix..	.. ..	817
Calvert's Sugar Estn. ..	Vol.	II.
Calx Chlorinata..	.. ..	51
,, *Sulphurata*,	¼–1 gr. ..	275
Cambogia,	½ to 2 gr.	817
Cammidge on Diabetes	..	1023
See also Insulin.		
Cammidge's Reaction ..	Vol.	II.
,, Modified Benedict Test	V.	II.
Camphine ..	.. ..	685
Camphoid ..	.. ..	366
Campho-Phenique	.. ..	219
Camphor. (and artif.),	2 to 5 gr.	276
Camphor Ball ..	.. ..	277
,, Essential Oil of	..	276
,, Linim. ..	..	277
,, Monobrom.,	2 to 10 gr.	279
,, Salicyl.,	1 to 5 gr. ..	279
Camphorated Carbolic Acid	..	18
,, Chalk ..	..	277
,, Chloroform	..	304
,, Wool ..	..	279
Camphre de Persil	.. ..	181
Camphylene ..	.. ..	566
Canada Balsam, Xylol, etc.	Vol.	II.
Canadian Hemp Root,	aver. 15 gr.	182
Cancer *vide* Therap. Ind.	1015 & V.	II.
Candle Nut Oil	.. ..	838
Canella Alba ..	.. ..	817
Cane Sugar ..	.. ..	732
Cannabinol ..	.. ..	280
Cannabis Indica	.. 280 & V.	II.
Cannabis Sativa	.. 280,	817
Cantharis,	1–16 to ½ gr. ..	281
Cantharidinum ..	.. ..	281
Canton's Phosphorus ..	..	275
Cantueso, F.E. = Lavandula Stœchas		
Caoutchouc and Liquor	284 & V.	II.
Cape Geranium	.. ..	843
Capsicin,	1–20 to 1–10 gr. ..	286
Capsicum,	⅛ to ¼ gr.	286
Capsicum Gamgee Tissue	..	288
,, Pencils ..	..	287
,, Wool..	.. ..	288
Capsogen	.. .. ..	288
CAPS., Gelatin (G = Gelatin Gl = Glass) ..	..	684
,, Agrimony Ext.	..	808
,, Allyl Sulphid.,	½, 1, 2 m.	809
,, Ammonia (Gl.)	3 m ..	160
,, Ammon. Quin. =	1 dr. Tinct.	726
,, Amyl Nitrite (Gl.),	1, 2, 3, 4, 5, 6, and 10 m.	165
,, Salicyl,	3 gr. ..	79
,, Amylene-Chloral.	8 m,..	811
,, Amylene Hydrate,	10 m.	811
,, Apiol,	3, 5, and 10 m. ..	181
,, ,,	5 m., Ergotin, 2 grs.	182
,, Arsamin,	1 and 2 gr. ..	202
,, ,,	1 gr. c. Blaud 5 gr.	202
,, ,,	c. Quinin., 3 grs.	202

NAME.	DOSE.	PAGE
CAPS.,	Benzol, 5, 10 and 15 m.	322
,,	Benzyl Benz. 3, 5 m. ..	324
,,	Benzyl Succ. 5 gr. .. c Papav. ½ gr. ..	325
,,	Blaud Pill, 5 gr. (and comps.)	424
,,	Blenosan	625
,,	Brometone, 5 gr. ..	259
,,	Brominol 33 %, 2 Gm.	258
,,	Bromoform, ½ m. ..	259
,,	Calc. Iodoricinoleate, 3 grs.	622
,,	Calc. Permang., ¼ gr. ..	548
,,	Carbol. Acid, 1 and 2 gr.	21
,,	Cascara (mild) ..	288
,,	Cascara (strong) ..	288
,,	,, (mild)c. Euonymin, 1 gr. ..	288
,,	Castor Oil, ½, 1 dr. and Co.	621
,,	Chaulmoogra Oil, 5 to 20 gr.	608
,,	Eth. Ester	610
,,	Chemical Food, 1 dr. ..	431
,,	Chloretone, 5 gr. ..	261
,,	Chlorodyne, 5 m. ..	305
,,	Chloroform 10, 20, 30 & 60 m. Sterules, 303; and 5 m. (G.) ..	304
,,	Chloromorph. Sol., 5 m.	305
,,	Cinnamic Aldehyde, 1 m.	30
,,	Cinnamon Ol. 2½ m. c. Quin. 1 gr.	311
,,	Cod L. Oil, ½, 1 dr. ..	617
,,	∫ Cod L. Oil, 19m., \	
,,	\ Creosote, 1 m., ∫	
,,	and with Blaud P. ..	617
,,	Codein c. Ext. Cannabis	361
,,	Codeinæ et Valerianæ Comp.	361
,,	Colchicine Salicyl. = 1/250 gr.	364
,,	Copaiba, 5, 10, 15 m. ..	623
,,	∫ Copaiba, 5, 10 m. \	
,,	\ Cubeb Ol., 5,10 m. ∫	623
,,	Copaiba, 5 c. Santal, 5m.	623
,,	Creocarb	394
,,	Creosotal, 5, 10 m. ..	395
,,	Creosote, 3, 5 m. ..	394
,,	Creosote Valer., 8 m. ..	396
,,	Cubeb Oil, 10 m. ..	399
,,	Cubeb, 5, c. Santal Oil, 5 m.	623
,,	Cyllin, 1 and 3 m. ..	36
,,	Cyperi Ext. Liq., 5 m...	826
,,	Damiana Ext., (30 m. Liq.)	827
,,	Distilled Water, Sterile	231
,,	Dormiol, 8 m. ..	811
,,	Easton Syrup = ½ & 1 dr. et aa. c. Arsen., 1/50 gr	432
	Ergot and Apiol ..	182
	Ergotin, 3 and 5 gr. ..	417
,,	Erigeron Oil, 5 m. ..	828
,,	EthyleneBromide, 1 m.(G.)	807

NAME.	DOSE.	PAGE
CAPS.,	Ethyl Chlor. (Gl.), 3, 5 and 60 Gm.	121
,,	Ethyl Iodid Co. (Gl.) ..	122
,,	Ext. Filicis Liq., 15 m.	434
,,	Fehling's Sol. (Gl.) 1 Cc... ..	Vol. II.
,,	Fel Bovinum, 5 gr. ..	423
,,	Ferri Carb. Sacch. 5 gr.	424
,,	Ferri Glyceroph, Co 1 *t.d.*	44
,,	Ferri Oleatis, 5 gr. ..	605
,,	Formalised Gelatin	498, 684
,,	Formidin, 5 gr... ..	500
,,	Glutoid	684
,,	Glyceroph. = ½ dr. & 1 dr. of Syrup	47
,,	Gonal	623
,,	Guaiac Resin, 5 gr. ..	453
,,	Guaiacol, 2, 5 m. ..	397
,,	,, 1 gr., c. Iodoform, 1 gr.	397
,,	Guaiacol, ¾ gr. c. Cod L. Oil, 5 m.	397
,,	Gynocardia (Chaulmoogra), 5 to 20 gr. ..	608
,,	Hæmoglobin, 5 gr. ..	578
,,	Holadin..	641
,,	Hydrastis = 30 m. Ext. Liq.	483
,,	Hypnone, ¾ min. ..	5
,,	Ichthyol, Amm., or Lith., 4 gr. also aa., 2 gr. ..	495
,,	Iodicin, 3 gr.	622
,,	Iodinol 25%, 2 Gm. ..	503
,,	Iodoform (glutoid) ..	498
,,	Iron Carb. Sacch., 5 gr.	424
,,	,, Iodide = 10 & 30 m. Syr.	429
,,	Izal 2 m. (& with Cod Liver Oil, 5 m.) ..	37
,,	Kerol	37
,,	Lecithin, 1½ gr. ..	535
,,	Lymph Co.	965
,,	Male Fern Ext., 15 m..	434
,,	Magnes, Oleat. 10 gr. ..	606
,,	Menthol Paraffin ..	550
,,	Meth. Blue, 2 gr. (and Comp.)	331
,,	Myrtol, 2 and 5 m. ..	845
,,	Nisbet's Specific, 20 m.	624
,,	Nitric Acid, 1 m. (Gl.)	V. II.
,,	Nitrite of Amyl (Sterules)	165
,,	Nitroglycerin, 1–100 and 1–50 gr.	571
,,	Ol. Allii, ½, 1, 2 m. ..	809
,,	,, Cedri Atlant, 8 m. ..	820
,,	,, Chaulmoogra, 5–20 gr.	608
,,	,, Elliott, ½ m. (three to 5)	847
,,	Ol. Gaultheria, 10 m. ..	79
,,	,, Papav., 15 m. ..	620
,,	,, Turpentine, 5, 10m.	685
,,	Oleic Acid, 7½ m. ..	601
,,	Olive Oil, ½, 1 dr. ..	618

NAME. DOSE.	PAGE
CAPS., Ox Bile, 5 gr.	423
,, Ovomammoid ..	949
,, Papaveris	626
,, Paraffin (for Catheters)	656
,, Paraldehyde,20,30,40m.	133
,, Pavimol, 15 m., 2 to 4 twice daily	620
,, Phosphorated Oil, 5 m.	676
,, Poppy Seed Oil, 15 m.	620
,, Potass Iodide, 5 gr. ..	700
,, Potass Permang., 1 gr.	546
,, Quin. Salicyl., 5 gr. ..	719
,, Sahli's 498,	684
,, Salol, 5 and 10 gr. ..	94
,, Santal and Kava ..	625
,, Santalol, 5 m. ..	622
,, 4 m. c. Methyl Salicyl., 1 ..	623
,, Santal Oil, 5 and 10 m. c. Methylene Blue, ½, 1 and 2 gr. ..	623
,, Santal Oil, 5 to 20 m.	623
,, Savaresse, 10 m. ..	623
,, Sod. Chaulmoograte 'A,' 1, 2 and 3 gr. ..	609
,, Sodium Oleate, 5 grs. ..	736
,, ,, ,, Co., *m.et n.*	736
,, Sulphonal, 5, 10 gr. ..	769
,, Syr. Fe. Ph. Co. 1 dr. ..	431
,, Terebene, 5 and 10 m. .	777
,, Terpinol, 1½ m. ..	777
,, Turpentine, 5, 10 m. ..	685
,, Valerianatum Co., 1 *t.d.*	728
Capsuloids .. .. Vol.	II.
'Capsungs 'Hydrarg. Oleat Ung.	602
Captol	296
Caracol, F.E. = Helix Aspera et *var.*	
Caraway..	819
Carbamide, 10 to 60 gr. or more	789
Carbasus. *See* Gauzes.	
Carbo Animalis	817
Carbohydrates	588
Carbo Ligni (and Cocoa Nut) ..	817
Carbol-Fuchsin Solution .. V.	II.
,, Gentian Violet & Methylene Blue; Thionin V.	II.
Carbolic Acid	16
,, Coefficient .. Vol.	II.
Carbolic Acid Lotion	18
,, Oil	19
,, Gauze	19
Carbolised Camphor, 18; Gauze and Bandages, 19; Iodine Sol., 20; Resin, 21; Smelling Salts, 21; Wool	19
Carbon Bisulphidum, 817; Dichloride, 306; Dioxide, 25, Monoxide .. .. 845 & V.	II.
Tetrachlor 10 to 45 m. in several capsules	818
Carbon Tetrachlor, Iodised ..	818
Carbonic Anhydride	25
Carbonic Snow	25
Carbonite	569
Carbonyl Chloride	789

NAME. DOSE.	PAGE
Carborundum, V. II.; Carburetted Gas .. .. Vol.	VII.
Carcinoma. *See* Therap Index and Vol.	II.
Cardamomi Semina	819
,, Wild	867
Cargile Membrane	944
Carica Papaya	650
Carlsbad Salt, True and Artif	754
Carmalum	819
Carmeliter Geist	842
Carmine	819
Carnauba Wax .. ..V.	II.
Carnotite .. .. Vol.	II.
Carnrick's Peptonoids 662 & Vol.	II
Carrel-Dakin Treatment 58,	331
Carter's Little Liver Pills Vol.	II.
Catgut	535
Carrageen, 823; Carron Oil ..	274
Cartilage, Hyaline	577
Carui Fructus	819
Carum Copticum	782
Carvacrol, 848; Carvol, Carvonum	819
Caryophyllum	819
Casca Bark	422
Cascagar, 1 teaspoon to 2 tablespoons..	288
Cascara, 3 to 15 gr. .. 288 & V.	II.
,, ads ,, 288; Pastils	290
,, Jelly, 1 to 4 dr. ..	288
Cascarilla, Cascarillin	820
Casein	586
Estimation .. Vol.	II
Caseinogen	586
Cashew Nut	811
Casse en Batues	820
Cassell's Preps. . .. Vol.	II.
Cassia Acutifolia, Angustifolia	858
,, *Fistula and Pulp* ..	820
,, *Fructus*	820
Castela Nicholsoni	822
Castellani's Antimon. Tart. Injn., ½ to 1 Cc.	175
Castellani's Tetra and Penta and Hexa Vaccines	931
Castille Soap .. .. Vol.	II.
Castoreum	820
Castor Oil, 1 to 8 dr.	620
Castor Oil Powders	622
,, Solutions of Alkaloids	621
Casts .. .. .. V.	II.
Casumen	586
Cataplasma Kaolini	443
Cataplasma Salicyl. Co. ..	443
Catarrh 1017, Vaccines for 883,	898
Catechu Pallidum, 5–15 gr. ..	820
,, *Nigrum*, 5–15 gr. ..	825
Catgut Ligatures	530
Catha	291
,, Cocoa Milk	292
,, Milk and Glyceroph. ..	292
,, Phenolphthalein Eff. ..	292
Catheters, Sterilisers, etc. ..	284
Catheter Oil, 19; Salol Oil ..	95

NAME.	DOSE.	PAGE
Catheter Lubricant, 465, 656; (Adrenalin), 964; Surgical Lubricant	.. .. ..	19
Cathode	.. .. ..	Vol. II.
Cat's Hair, 829; Cat's Tail	..	828
Caulophyllin, 1 to 4 gr.	..	820
Caustic. *Mitigated and Tough*	..	187
,, Barii	.. .. ..	234
,, Zinci Chloridi	..	799
Cavendish Moss, 760; Water	..	755
C.E., 303; Cedar Wood Oil, 820; Cedrene	.. .. ..	820
Cedrus Atlant	.. .. ..	820
Celandine	.. ..	822, 853
Celerina, 266; Celery	.. ..	182
Cellafine	.. .. ..	448
Celloidin and Sol.	..	364, 365
,, 'Sacs'	..	Vol. II.
Cellotropine, ½ to 1 Gm.	..	813
Celluloid, 366; Splints 366 & plates		
Cellulose Acetate	.. ..	451
Cellulose Films	.. ..	447
Wadding and Tissue	..	448
Celmo	.. .. ..	Vol. II.
Cephaeline (and HCl.), Emetic 1/12 to 1/6 gr.	.. ..	531
Cephaelis	.. .. ..	514
Cera Alba, Flava	.. ..	821
,, Aseptica	.. .. ..	821
Cerasin Red	.. .. ..	326
Cerato Laudanizado, F.E. = Sydenham's Laudanum, 1 to 9,		
Ceratum, U.S., 652; Galeni, 847; Nucistæ, 844; Petrolei, 652; Resinæ	.. .. ..	853
Cerebos Salt, 745; Cerebral Extract	.. .. ..	945
Cerebro-Spinal Fever	.. 885, V. II.	
,, ,, 'Carriers'	885, 888	
Cerebro-Spinal Fluid	.. V. II.	
Cereoli *vide* Bougies	.. ..	
Ceresin	.. ..	651
Cereus, Night-blooming	..	821
Cerevisiæ Ferment., ½–1 oz.	..	292
Cerii Oxalas, 3 gr.	.. ..	821
,, Oxidum	.. ..	Vol. II.
,, Sulphocarb., 1–5 gr.	..	821
Cerium	.. .. ..	Vol. II.
Cerussa	.. ..	693
Cetaceum	.. ..	821
Cetraria (Cetrarin, 2–4 gr.)	..	821
Cetyl Alcohol (and Palmitate)		821
Cevadilla Seeds, Cevadine	..	865
Ceyssatite, 156; Chalk's Bottles		228
Chalk Mixture, ½ to 1 oz.	..	267
Chamomile Flowers	..	496, 812
Chancres, Exam. of	..	Vol. II.
Chaparro Amargosa	.. ..	822
Charbon Naphtholé, 60 to 120 gr.	.. ..	564
Charcoal (Animal, Wood, etc.)	.. ..	817
Charta Sinapis (Sinapizata)	..	738
Chatin and Goitre	.. ..	699
Chaulmartin	.. .. ..	610
Chaulmoogrates	.. ..	608
Chaulmoogra Esters.	.. ..	610
Chaulmoogra Oil, 5–10 m.	..	606
Ointment	.. .. ..	608
Cheatle's Green Spray	.. ..	329
Cheatle's Paste	.. .. ..	467
Chebulic Myrobalans	.. ..	827
Cheese, 586; Chekan	.. ..	822
Cheratina	.. .. ..	683
Cheiranthus Cheiri	.. ..	822
Chelidonium Majus	.. ..	822
Chelsea Pensioner, 1 to 2 dr.	..	770
Chemical Food, ½–2 dr.	..	430
Chemotherapy	.. ..	205
Chenopodium	.. .. ..	822
Cheron's Serum	.. ..	744
Cherry Bark, Wild	.. ..	850
Cherry Laurel Water	.. ..	163
Chestnut (Horse)	.. ..	806
Chian Turpentine	.. ..	863
Chicken Ess., Peptones	..	576
,, Jelly	.. .. ..	640
,, Pox and Small Pox	..	935
Chiendent	.. .. ..	497
Chilblains	.. .. ..	1018
Chillie Paste (Smedley's)	..	287
China Clay, 155; Root	..	830
Chineonal, 10 gr.	.. ..	793
Chinese Almond, 812; Ink	Vol. II	
Chinina, etc., *vide* Quinine	..	
Chinoform, 1 to 5 gr.	.. ..	711
Chinolini Tart., 5 to 15 gr.	..	327
Chinolinum, 3 to 10 m.	..	327
Chinosol, 1 to 5 gr., 327; Gauze		327
Chirata, 823 Japanese	..	823
Chloral Caffeine hyp. 3–8 gr.	..	265
Chloral Camph. (et c. Cocain)	..	295
,, c. Menthol, c. Phenol, c. Thymol	.. ..	549
,, *Formamidum*, 15 to 45 gr.	.. .. ..	296
,, Hair Stimulant	..	296
,, *Hydras*, 5–20 gr.	..	294
,, Tannin	.. ..	296
Chloralamid, 15 to 45 gr.	..	296
Chloramine-T., 60, Bact. Power, 61; Gauze, 61; Ointment, 61; and Tabs, 8·75 and 43·75, 61; Oily Suspension		61
Chloratiffice	.. .. ..	697
Chlorazene	.. .. ..	60
Chlorazol Blue, 3B.	.. ..	203
Chlorbutol	.. .. ..	261
Chlorcosane	.. .. ..	63
Chloretone, 5 to 24 gr.	..	261
,, Gauze	.. ..	261
,, Inhalant	..	261
Chlorhydrate d'Amyleine	..	356
Chloric Ether, 30 to 40 m., or 5 to 20 rep.	.. .. ..	305
Chlorinated Eucalyptol	..	62
,, Paraffin (Liquid & Hard)	.. ..	62
Chlorine, Poisoning by	..	1064

NAME. DOSE. PAGE

Chlorine Treatment of Scabies, *see* Scabies Therap. Index.
Chlorobrom, ½ to 1 oz... .. 297
Chlorodyne (Caps., 5 m.), 5 to 15 m. 305
Chloroform, 1 to 5 m. 297 & Vol. II.
,, and Ether Anæsthetic .. 303
,, c. Ethyl Iodide, Sterules. 304
,, Inhalers 298
,, -Oxygen-Anæsthesia .. 300
,, Sickness 300
,, Sterules, 10, 20, 30, 60 m., and G, 5 m. .. 303, 304
Chloroform, Aconiti, 1 in 1 .. 108
,, Camphorat .. 304
,, Iodi, 1 in 30 .. 502
,, Mastiche 304
Chlorogenine 810
Chloro-ortho-cresol 39
Chloromorphiæ Liquor, 5 to 15m. 304
Chlorophyll 823
Chloro-Sodio-Mag. Aper., 1 dr. or more 754
Chloryl Anæsthetic 119
Chocolate 778
,, Culture Medium .. 887
Cholelysin 736
Choleokinase 423
Cholera, 889; Mixtures, 392; Treatment, 744; Vaccines, 889; Vibrio .. 890 & Vol. II.
Cholesterin 112
For Syph. Test .. Vol. II.
Chologestin, ½ oz. 640
Choline 7
,, Borate Solution, 3 to 20 Cc. dil. 7
,, stearo-glyceroph., 3 to 5 gr. 534
Chologen Tablets 694
Chondrigen 577
Chondrin 577
Chondrus 823
Chrismaline 653
Christmas Rose.. 865
Christopherson's Bilharzia Treatment 176
Chromic Anhydride 804
,, Catgut (Lister) .. 535
Chromii Sulphas 536
Chromo-santonin, 2 to 5 gr. .. 735
Chrymotherapy.. 25
Chondrodendron toment .. 848
Chrysarobinum, ⅛ to ½ gr. and preps... 307
Chrysarobin Acetates 308
Chrysoidine 332
Churchill's Hypophosphites .. 679
,, Inhalant 701
,, Iodine 507
Chyluria.. .. .. Vol. II.
Cibrola 43
Cicfa .. .. .. Vol. II.
Cicatricine, 8 to 15 m... .. 740
Cicuta, F.E.=Conine; C. Virosa 823
Cicutine, ⅓ to 2 gr. 390
Cigarettes, 845; Asthma, 701; Cubeb, 399; d'Espic.. .. 701
Cigue 390
Cimex *Var.* .. .. Vol. II.
Cimicifugæ Rhizoma, 15 gr. .. 823
Cimicifugin, 1 to 6 gr... .. 823
Cimolite, 155; Cina 734
Cinchona Calisaya, 'gray,' Lancif., Officinalis, etc. 308 & Vol. II.
Cinchona Febrifuge 704
,, Cultivation 309 & Vol. II.
Cinchonæ Succirubræ Cort., 5 to 60 gr. 308
,, Alkaloids, Tests Vol. II.
Cinchonidine 703
,, HCl. 703 (& Ac.), 1 to 10 gr. .. 707
,, Bismuth Iodide, ⅛ to 1 gr. .. 243
,, Salicyl., 5 gr. .. 708
,, Sulph., 1 to 10 gr. 707
,, Periodide, 1½ to 3 gr. .. 148, 708
Cinchonina and HCl. and Ac. HCl., 1 to 10 gr. 708
,, Sulph., 1–10 gr... 708
,, Sulphocarb .. 708
Cinchophen, 30 to 45 gr. *p.d.*... 327
Cineol, 1 to 4 m.. 614
Cinnabar=Red Mercuric Sulphide 482
Cinnaldehydum (Cinnamal), 1 m. 30
Cinnamomi Cort., 10–30 gr. .. 310
Cinnamon Paste, Dental 311, 499
Cinnamon, Wild 817
Cinnoxyl Caps. 325
Cinyl Alcohol 777
Citral .. .. .. Vol. II.
Citrated Milk 581, 748
Citrine Ointment 471
Citronellæ Oleum .. Vol. II.
Citronellol .. .. Vol. II.
Citronen l .. .. Vol. II.
Citrus var. 232
Clarke's Blood Mixture Vol. II.
,, Soap Solution.. Vol. II.
Claudius' Iodine Solution .. 536
Clayton Gas .. .. Vol. II.
Cleaver's Grass 831
Clemens' Solution, 1 to 5 m... 193
Clothes Louse 1047
Cloud-berry 854
Cloudy Ammonia 160
Cloves, 819; Clubmoss Spores 840
Coagulose 928
Coal Gas, poisoning, *see* Carbon Monoxide 1064
,, Tar Derivatives 311 & Vol. II.
,, ,, Disinfectants, 34, *et seq.* & Vol. II.
,, ,, Inhaler and Vaporiser 312
,, ,, Soap 737
Cobra Venom 946
Coca Chewing Gum 337
Cocæ Folia, 30 to 120 gr. 337 & V. II.

NAME.	DOSE.	PAGE
Cocaina, 1/20 to ½ gr.	..	338
Tests, Manufacture ..		Vol. II.
Cocaina c. Oleo 2% ..	..	341
Cocainæ Carbolas ..	..	347
,, Citras, Formas	..	342
,, HI. HBr. ..	..	346
,, *Hydrochlor*, (1/10 to ¼ gr., *Off.*)	.. 342 &	V. II
,, Lactas.. ..	1/10 to	346
,, Nitras ..	½ gr.	347
,, Nitris	..	347
,, Phenas . ..	..	347
,, Salicyl.. ..	..	347
,, Sulph. . ..	..	346
Cocaine 'Activated' ..	..	143
,, Abuse of ..	..	339
,, Antidotes ..	..	341
,, Dental Use ..	..	342
,, Dusting Pdr. ..	..	350
,, Eye Drops (Factory Act) ..	.. 341,	990
,, Eye Lotion, Isotonic.		344
,, in Clove Oil ..	..	341
,, in Dentistry ..	..	982
,, Iodo HI. ..	..	346
,, Ionisation ..	Vol.	II.
,, Lanoline ..	..	341
,, Local Infflt. Anæsthesia c. ..	..	349
,, Lumbar puncture ..		350
,, Oleate	..	341
,, Perforation of Septum		340
,, Periodide, 1/40 to 1/20 gr. incr. ..	148,	346
,, Pharmacology of	Vol.	II.
,, Poisoning ..	..	339
,, Menthol-Eugenol ..		341
,, -Menthol-Phenol ..		341
,, Purification of .	Vol.	II.
,, Salts incompat. c. Sod. Bicarb. ..	..	143
,, Sniffing . ..	..	339
,, Sterilisation of Sols ..		344
,, Substitutes, Unrestricted Sale of ..	..	977
,, Synthetic ..	..	339
,, Tests for ..	Vol.	II.
,, for Tooth Extraction..		342
,, Toxicology ..	Vol.	II.
,, Uses of.. ..	..	347
,, *versus* Synthetics ..		349
Cocculus Indicus. ..	..	849
Coccus Cacti	..	819
Cochineal, Liquid, 819 (Indicator)		V. II.
Cochlearia Armoracia ..	..	824
Cocillana, 824; Cockle's Pills..		V. II.
Cocoa, 778 & Vol. II.; Food..		582
,, Nut Charcoal ..	..	817
,, Nut Oil, Shampoo, Stearin and Soap ..		102
Cod Liver Oil, 1 to 4 dr. ..		615

NAME.	DOSE.	PAGE
Cod Liver Oil Emulsions ..		617
,, ,, Substitutes ..		618
Codeina, ¼ to 2 grains ..	..	360
Codeine Glycerin Jelly, 1 dr...		360
Codeinæ HBr., ¼ to 2 gr. ..		361
Codeinæ HCl., ¼ to 2 gr. ..		361
,, Periodid., ¼ to ½ gr.	148,	361
Codeinæ Phosphas, ¼–1 gr. ..		362
,, Sulph., av. ½ gr. ..		362
Codeine-Sodium Diethylbarbiturate, 5 gr.		562
Codeine Methyl-Brom., ¾ gr...		362
Codeonal, 5 grains		562
Cofectant		36
Cognac .. .. 127 &	Vol.	II.
Cohen's Salicyl Mist, 1 to 2 dr.		82
Cohosh, Black, 823; Blue ..		820
Coke F., on Skin Tests 663 *et seq.*		
,, Oven Oils..		34
Cola Acuminata.		262
Colalin Tabs., ⅛ to ½ gr.; Colalin Laxative		757
Colchici Cormus, 2 to 4 gr. 362&	Vol.	II.
,, *Semina*, 3 gr. 362 &	Vol.	II.
Colchicine, 1/100 to 1/32 gr...		363
,, Salicyl. (Caps. 1/250 gr.).		364
Colchisal..		364
Colcothar		104
Cold Cream and Substitute ..		847
,, Vaccine		883
Coleman's Wincarnis ..	Vol.	II.
Coley's Cancer Fluid ..	Vol.	II.
Colic Root		808
"COLLAPSUBES" OF OINTMENTS, *p.* 13:—		
† ,, Aristol, 10%.. ..		500
* ,, Atropine, 1 in 100, &c.		229
* ,, Atrop., 1% & Cocain. 2%		229
* ,, Atrop., 1%, & Iodof..		229
* ,, Atropine, 0·5% c. .. Ung. Hyd. Ox. Flav., 1%		229
,, Bism., Morph. Coc. ..		241
,, Bism. Subgallate ..		249
* ,, Boric Acid Oint. ..		13
* ,, Boric Acid in White Vaseline, 1 in 60..		
,, Boric Cream		13
**†§ ,, ,, Vaseline ..		13
† ,, Dermatol, 10% ..		249
§ ,, Ferri Perchlor. ..		426
§ ,, Gall and Opium ..		632
§ ,, Hamam. (et c. Cocaina)		455
* ,, Homatropine and Cocaine, ea. 2% ..		
† ,, Hyd. Iodid, 1% ..		468
,, Hydrarg. Salicyl. ..		478

Those marked * are of small size for ophthalmic use.
† Are for urethral use. § For rectal use.
** For vaginal or uterine use. The last three with suitable attachments.

NAME.	DOSE.	PAGE
"COLLAPSUBES" OF OINTMENTS :—		
,,	Hydrastis (5% Liquid Extract).	
**†§ ,,	Iodoform, 5%, et Cocaina, 2%	500
† ,,	Iodoform, et Eucalypt., 5%	500
† ,,	Iodol, 5%, et Eucalypt.	501
†§** ,,	Lanolin & L. Cream..	
,,	Lubric. Jelly.. ..	441
* ,,	Methysal Balm ..	79
* ,,	Pagenstecher's, 1·25 to 10%	481
,,	Petroleum Cerate ..	652
† ,,	Picric Acid, ½% ..	76
† ,,	Silver Proteinate ..	188
,,	Surgical Lubricant ..	19
** ,,	Tannin, 10%	—
,,	Ung. Prophylaxis ..	464
**†§ ,,	Vaselin	652
† ,,	Zinc Permang., 1 in 2000	549
† ,,	Zinc Sulph., 1 in 500..	803
† ,,	Zinc Sulphocarb., 1 in 500	—
Collodium (contractile) .	..	364
,,	Acetonum	364
,,	Aceto-Æthericum ..	364
,,	Anodynum	364
,,	Belladonnæ ..	236
,,	Benzoini	365
,,	Callosum	365
,,	Cantharidis (var.) ..	282
,,	Cocainæ, 2% ..	341
,,	c. Ol. Crotonis, 1 in 7	365
,,	Elasticum	365
,,	*Flexile*	365
,,	Ichthyol	495
,,	Iodi, 30 gr. in 1 oz.	365
,,	c. Iodoform.. ..	498
,,	Paraformi	140
,,	Kelly's	365
,,	'Sacs' ..	Vol. II.
,,	Salicyl	365
,,	Salicyl. et Lact. ..	365
,,	c. Hyd. Perchlor	365
,,	,, c. Zinc	365
,,	Salol, 95; Styptic..	366
,,	*Vesicans*	282
,,	Zinci Chloridi ..	799
Collargol (Colloid Silver)	..	187
Collasan..	..	155
Collinsonia Canadensis .	..	824
Colloidal Metals . ..	..	366
(*see* also Iontophoresis, V. II.		
,,	Antiseptic Powers 388 & Vol. II.	
,,	Characters	366
,,	Doses, *see* Individual Solutions in text.	
,,	Manufacture, Methods	

NAME.	DOSE.	PAGE
Colloidal previously published		371
,,	Author's Chemical	375, 376
,,	Author's Electrical ..	387
,,	Metal Organsols ..	388
,,	Patents on	374
,,	Physological Expts.	378, 380, 382, 383, 385
,,	References	389
,,	Solutions, Aluminium	371, 376
,, ,,	Antimony	376, 387
,, ,,	Arsenic	377
,, ,,	Bismuth.. ..	377
,, ,,	Calcium . ..	377
,, ,,	Copper (1 in 2000)	377
,, ,,	,, Phosph. ..	379
,, ,,	Gold (1 in 4000)	379
,, ,,	Testin C.S.Fluid	Vol.II.
,, ,,	Iodine	380
,, ,,	Iron	381
,, ,,	Lead	381
,, ,,	Manganese ..	382
,, ,,	Mercury (1 in 2000)	382
,, ,,	Palladium ..	383
,, ,,	Platinum (1 in 4000)	383
,, ,,	Protectives for..	369
,, ,,	Selenium (1 in 5000)	384
,, ,,	Silver (1 in 2000)	384
,, ,,	(Collargol) ..	187
,, ,,	Sulphur (1 in 1000) ..	386, 770
,,	Verification & Tests..	370
,,	Therapy	375
,,	Uses	376
Collosols, Argent, 385, 386; Hydrarg, 386 *et seq.*; Iodine, 381; Manganese, 382; Palladium, 383; Selenium, 384; Sulphur		386
Collunarium Alum, T.H., 1%..		
,,	Pot. Permang., Liq., 6 m. in 1 oz., T.H.	
,,	Potass. Chlorat Co..	697
,,	Quininæ	724
,,	Zinc. Sulph., 0·1%..	
,,	Zinc Sulphocarb., 1 in 250	—
Collutorium Acidi Benzoici ..		9
,,	Acidum	107
,,	Alkalinum Co. ..	747
,,	Astringens	799
,,	Formalini	136
,,	Hydrogen Perox. ..	486
,,	Pot. Permang. ..	547
Collyr. Adstring. Lut. ..	..	803
,,	Hyd. Biniodidi.. ..	467
Colocynth, Pulpa, 2 to 8 gr. ..		389
Colocynthin	..	390
Colon Bacillus	..	890

Those marked * are of small size for ophthalmic use.
† Are for urethral use. § For rectal use.
** For vaginal or uterine use. The last three with suitable attachments.

NAME. DOSE.	PAGE
Colonic Anæsthesia	117
Colostrum	Vol.II.
Colza Oil	738
Comfrey..	862
Combined Cold Vaccine. ..	883
'Complement'	869
Comp. Asthma Fluid	227
Conarium	949
Condurango, 15 to 60 gr. ..	824
Condy's Fluids	548, 549
Conessine .. 142,	524, 834
,, Bi. Iodid.	525
Confectio Aromatica=Pulv. Cretæ Aromatica, 10–60 gr.. ..	630
Confectio Glyceroph Co.,1 to 2 dr.	46
,, c. Malt, 1 to 2 dr. ..	46
,, Guaiaci Co., 1 dr. ..	770
,, Petrolei, 1 to 2 dr...	656
,, *Piperis*, 60–120 gr...	
,, *Rosæ Gal.*	854
,, Rutæ, 1 to 2 dr. ..	855
,, Santonini Co., 1 dr...	735
,, Scammoniæ Co., '85, 10 to 30 gr.. ..	
,, *Sennæ*, 60–120 gr. ..	858
,, ,, et Piper. ..	858
,, *Sulphuris* (et c. Senna) 60 to 120 gr. ..	770
,, Terebinthinæ, '85, 60 to 120 gr.	
,, Vitelli, Cerevisiæ et Lim. Succ., ½ dr...	598
Congo Red	Vol. II.
Congreve's Elixir ..	Vol. II.
Conjunctivitis	1020
Conii Folia and Fruits, 2 to 8 gr.	390 & Vol. II.
Conine, ¼ gr., incr.	390 & Vol. II.
Coninæ, H Br., HCl., ⅓ gr. inc.	390
Conradi's Koleradraaber ..	392
Conradi Drigalski Medium	Vol. II.
Constipation	1020
Contents..	iii
Contraceptives	712
Contractile Collodion	364
Contramine Intram., 4 gr. ..	773
,, Intrav., 0·25 Gm. in 10 Cc.. ..	773
Convallaria Majalis	824
Convolvulin, 1 to 5 gr... ..	836
Convolvulus Purp.	836
Coolidge "X" ray tube	Vol. II.
Cooper's Weedicide stated to contain 36% of Arsenious Oxide by weight. Inquest on Mrs. Greenwood, June 16/20.	
Coorchi, *see* Kurchi.	
Copaiba, 30 to 60 m.	623
,, Oil, 5 to 20 m. ..	623
,, Resin	624
,, Soluble	624
Copal Solution	841
Copper Alanin	403
,, Comps., Organic ..	403
,, ,,Colloidal	379
Copper Hair Dye ..	Vol. II.
,, Lecithin	535
,, Points	402, 803
,, Sod. Tart.	403
Copra	102
Cordite	569
Coquelicot Fleurs de	626
Corallin	Vol. II.
Coriander	824
Cordova's Modefd. Eusol ..	56
Corn Ergot Oil and Silk ..	841
Corns, Collodions for	365
Cornutine, ⅛ to ¼ gr., *p.d.* ..	418
Coronilla	825
Coronium Bromide	762
Corpora Lutea, 5 to 10 gr. ..	945
Corrosive Sublimate	472
Cosclnium, 817; Coster's Paste	505
Costos	825
Cotarnine Base..	566
Cotarnine HCl., ¼ to ½ gr. incr. 566; Phthalate, ¾ gr. incr...	567
Coto Cort., 1 to 8 gr.	391
Cotoin, ½ to 2 gr.	392
Cotton Medicated	447
,, Seed Ext. Pdr., 1 dr. ..	452
Couch Grass	497, 808
Coumaric Treatment	30
Coumaric Anhyd., 32; Coumarin	32
Court Plaster, 835; Cowbane..	823
Cowhage, 1 to 2 gr., 435; Cow-pox, 934; Crab's Eyes = Calcii Carb.	
Craie Preparée	266
Cranesbill Root..	831
Cream Assay, etc. ..	Vol. II.
,, Cold	847
,, of Malt preparations ..	543
,, Salicylic..	81
,, of Tartar (Soluble, 703), 20 to 60 gr.	703
Creatinin, Creatin ..	Vol. II.
Crédé's Silver (Ung. 188), ½ to 2 gr.	187
Crembas.	111
Cremor Acid Salicyl	81
,, Emolliens	787
,, Frigid	847
,, Hamamelidis	454
,, Lowndes	464
,, Magnesiæ, 1 to 4 dr. ..	539
,, "Sicc" preparations..	787
,, Zinci (et Calaminæ) ..	801
Creo-Camph. Cream	460
Creocarb. Capsules	394
Creolin Pearson..	36
Creocamph.	219, 460
Creophen	36
Creosotal, 5 to 20 gr.	395
Creosote Carbonate, 5–20 gr...	395
,, Phenyl Propion, 10 m.	396
,, Valer., 4 to 12 gr. ..	396
Creosoted Oil	657
Creosotum, 1 to 5 m. incr., 392 & V. II.; *Cresol*, 1 to 3 m.	33&V.II.

NAME.	DOSE.	PAGE
Cresol Soap Soln. for vermin	..	37
Cresolo Grezzo	.. .. ..	34
Cresylic Disinfectants	.. ..	34
Cresyl hydrate	.. .. ..	33
Creta Gallica	.. .. ..	156
,, *Præparata*, 15–60 gr.	..	
Crile's Anoci-Association		116, 491
Crile's Tube	.. .. ..	300
Crinoline Bandages	.. ..	275
Crocus	.. ..	825
Crooke's Colloids	.. ..	374
Crosby's Balsamic Elixir		Vol. II.
Crotalin, 946; Crotin	.. ..	846
Croton-Chloral Hyd., 5 to 20 gr.		260
,, Eluteria	.. .. ..	820
,, Gubouga	.. .. ..	847
,, Tiglium	.. .. ..	846
,, Elliottianus	.. ..	847
Cryogenin, 3 to 24 gr.	.. ..	10
Crystal Violet	328, 330, &	Vol. II.
Crystallography in chemical analysis—*vide*		L. i./17, 798
Crystalloids	.. .. ..	367
Cubeb Cigarettes	.. ..	399
Cubebæ Fruct., 30–60 gr.		399, 623
Cuca, *see* Coca.		
Cucumber Ointment	.. ..	825
Cucurbitæ Semina Præp., 3 to 4 oz.	.. ..	825
Cudbear	.. .. ..	Vol. II.
Culex Imp., Pip. Pungens, etc.		V. II.
Culture Media	.. ..	Vol. II.
Culvers Root	.. .. ..	839
Cumene, Cumol	.. .. ..	536
Cupralgin = Cupri-Alginas	..	808
Cuprase	.. ..	379
Cuprea Bark	.. .. ..	399
Cupreine and Comps.	.. ..	399
Cuprentum	.. .. ..	401
Cupri Acet., 1–12 to ½ gr.	..	401
,, Alanin	.. .. ..	403
,, Alginas, $\frac{1}{24}$ to $\frac{1}{6}$ gr.	..	808
,, Alloxanas	..	Vol. II.
,, Amino-propionas	..	403
,, Ammon, Sulph.	.. ..	402
,, Arsenis, $\frac{1}{100}$th to $\frac{1}{25}$th gr.		195
,, Aseptol	.. .. ..	22
,, Chloridum, ¼ to 2 gr		403&V.II
,, Citras	.. .. ..	401
,, Glycinas	.. ..	Vol. II.
,, Hippuras	.. ..	Vol. II.
,, Nucleinas	.. ..	294
,, Oleas	.. .. ..	601
,, Oxidum	.. .. ..	401
,, Subacetas	.. ..	401
,, *Sulphas.*, ¼ to ½ gr.; emetic 5 to 10 gr.	.. ..	401
,, Sulphocarbolas	.. ..	22
Cupric Test Pellets	..	Vol. II.
Cuprocian	.. .. ..	403
Cuprol	.. ..	294
Cuprum, 401 & Vol. II.; Aluminatum	.. .. ..	403
"Cuprung"	.. .. ..	401
Curara, $\frac{1}{20}$th to ½ gr.	.. ..	825

NAME.	DOSE.	PAGE
Curarina, $\frac{1}{100}$ to $\frac{1}{40}$ gr.	.. ..	826
Curdled Milk	.. 70 &	Vol. II.
Curdling Ferment	.. ..	637
Curd Soap	.. .. ..	736
Curic Wafers, V. II.; Curicones, V. II.; *Cusso*, ¼ to ½ oz.	..	
Curschmann's Solution, 15 m.		278
Cusparia	.. ..	826
Cutaneous Tests.	.. ..	663
Cutch, *see* Catechu nigrum	..	820
Cuticura	.. .. ..	Vol. II.
Cyanamide	.. ..	Vol. II.
Cyanide Gauze, and Paste	..	467
Cyanine Dyes	.. .. ..	327
Cyanuretum Hydrargyri	..	464
Cyclic Ureides	.. .. ..	790
Cydoniæ Semina	.. ..	826
Cyllin Preps., 1 to 5 m.	..	36
Cymene, 536; Cyna	.. ..	734
Cynips Gallæ	.. .. ..	831
Cynoglossum, 826; Cynotoxin		182
Cyperus Rotundus	.. ..	826
Cypress Oil	.. .. ..	826
Cypripedin, 1 to 3 gr.	.. ..	826
Cystamin, 5 to 15 gr.	.. ..	456
Cystazol Tabs., 1 to 3 in water		458
Cystin	.. .. ..	Vol. II.
Cystoformin	.. .. ..	459
Cystogen, 5 to 15 gr.	.. ..	456
Cystopurin, 30 gr.	.. ..	459
Cytisine, 826; Cytisus Laburnum		826
Cystisus Scoparius	.. ..	757
Cytolysin	.. .. ..	869
Daccol Vaccines.	.. ..	925
Daisy Powders	.. ..	Vol. II.
Dakins' Hypochlorite Solution (Stronger)		57
,, ,, (Weaker)	..	58
,, ,, Uses	.. ..	58
,, ,, Daufresne's Modfn.	..	59
Dalby's Carminative	..	Vol. II.
Damaroids	.. ..	Vol. II.
Damiana, 826; Dammar	..	827
Damson, Mountain	.. ..	859
Dandelion	.. .. ..	863
DANGEROUS DRUGS ACT, 1920—		983
,, S.R. & O's under 985 *et seq.*		
,, Prescriptions, 987; N.H.I.,		987, 992, 993, 994
,, Marking of Packages	..	987
,, Records, 988; (Schedule)		989
,, General Authorisations	..	988
,, Exempted products		989, 990
,, Hospitals	.. .. ..	990
,, Nursing Homes	..	990, 994
,, Special Authorisations	..	990
,, Midwives	.. .. ..	991
DANGEROUS DRUGS ACT, 1923—		991
,, Amending [P] Sales	..	992
,, 'Signed Orders'	..	992, 994
,, Percentages	.. ..	992
,, References	.. ..	993
,, Draft Label Order (1924)		993

NAME. DOSE. PAGE

DANGEROUS DRUGS ACT, 1923, *-ctd.*
,, Points of Assistance .. 994
,, Notes for Employees .. 995
,, Supplies to Medical Men 995
D.D.A. CALCULATION TABLES 996, 998
,, Examples of Scrips 999, 1001
,, ,, of Dentist's Scrip . 1001
,, ,, ,, Vet. Surg's Scrip 1001
,, ,, ,,'Signed Order'.. 1001
Daphne 843
Datura var. 493, 761
Daturæ Folia et Semina. .. 761
Daturina and Sulph. 761
Daufresne's Modfd. Dakin Soln. 59
Dearborn Preps. .. Vol. II.
Deba 790
Decalcified Dietary 271
Dechlorination 745
Decocta Concentrata 403
Dec. *Acaciæ Cort.*, ½ to 2 oz... 804
,, *Agropyri*, ½ to 2 oz. .. 808
,, Apocyni, ½ to 1 oz. .. 182
,, Cetrariæ, '85, *ad lib.* .. 821
,, Chondri 823
,, Cinchonæ, '85, 1 to 2 oz. 309
,, Cydoniæ 826
,, Eucalypti, 2 to 4 dr. .. 828
,, Euphorbiæ Pepli, 1 tea-cup 829
,, Granati Cort., B.P. '98, 1 in 5, ½ to 2 oz... ..
,, *Hæmatoxyli*, ½ to 2 oz. ..
,, *Ispaghulæ*, ½ to 2 oz. .. 836
,, Lini 840
,, Papav. (et c. Anthem.).. 626
,, Pareiræ, '85, 1 in 16, std. hot, 1 to 2 oz. .. ..
,, Psyllii, *ad lib.* 851
,, Quercus, 1 to 2 oz. .. 853
,, *Sappan*, ½ to 2 oz. .. 833
,, Sarsæ and Co., '85, 2 to 10 oz. 856
,, Scoparii and Tarax,. '85, 2 to 4 oz. .. ..
,, Simarubæ et Granati, 1 oz. 859
,, Tritici, ½ to 2 oz... .. 808
,, Ulmi, 2 to 4 oz. 864
,, Zittmanni F. et Mit. .. 856
Defatted Tuberc. Vacc. .. 925
Delectol 655
Delhi Boil .. .. Vol. II.
Delphina, $\frac{1}{64}$ to $\frac{3}{4}$ gr. 861
Dengue Fever .. .. Vol. II.
Dental Anæsthetic, 10 to 25 m. 342, 343
,, Arsenical Fibre & Paste 194
,, Compo 837
,, Dressings, Sterile .. 451
,, Extractions 342
,, Fillings 800
,, Mastich, 841; Plasters, 286; Rubber . .. 284
,, Solubes, Antiseptic, 20; Wax 653

NAME. DOSE. PAGE
Dentist's Scrips for Drugs, *see* 983 *et seq.* & 1001
Depilatories 234, 276, 755
Dentists Act 1002
Derbyshire Neck, 699; & Therap. Index.
Dermatol 249
Dermogen 487
Desoxycholic Acid 757
Detoxicated Vaccines 941
Developer, Photographic Vol. II
Devil's Milk 829
Dewees's Mixture, ½ oz. .. 150
Dextrin 440
Dextrin Injection Intrav. .. 2
Dextrose, 438; Enema.. .. 414
Dhobie's Itch .. .. Vol. II
Diabetic Foods, 588; Urines, Vol. II.
Diabetin.. 733
Diabetes, 1023, *see* also Insulin.
,, Innocens 645
,, Mell. Insulin in 641 *et seq*
,, Prognosis 648
,, Drugs in 648
Diacetyl-Morphine HCl., $\frac{1}{25}$ to ⅛ gr. 559
Diacetyl Tannin, 5 to 15 gr... 107
Diachylon Plaster 603
Dial Tabs., 1½ gr. *Dose*, ½ to 3 Tabs.. . 795 & Vol. II
Dialacetin 795
Diamalt and with Oil.. .. 543
Diamide.. .. .. Vol. II
Diamido-azo-benzene HCl. .. 332
Diamidodiphenyl .. ..V. II
Diamidophenol HCl. = Amidol. V. II
Diamino-Acridine Sulphate, 318; HCl., 319; Patents, 318; Antiseptic Power, 319; Oleate, 319; Uses 319
Diamino-Methyl-Acridine Chlor. 320
,, ,, HCl. 312
Diamorphinæ Hydrochloridum, 1/25 to 1/8 gr. 559
Dangerous Drug Restrictions 983
Dia-Paraffin 543
Diaphanite .. .. Vol. II
Diaphorm, 1/25 to 1/8 gr. .. 559
Diaplyte Vaccines 925
Diarrhœa Mixtures 392
Diascordium 863
Diaspirin 86
Diastase, Malt, *syn.* Maltine 542 & Vol. II.
,, Pancreatic 637
Diastasic Power, Expts. on. Vol. II
Dibromfluorescein .. Vol. II
Dibromo-oxy-Mercury-Fluorescein 674
Dichloramine-T.. 62
,, in Eucalyptol .. 62
Dichlorbenzene *p.* 32
Dichlorethylene 30
Dichlorethyl-sulphide 106

NAME.	DOSE.	PAGE
Dichloride of Ethylene		306
Dictamnus Fraxinella		827
Didymin		965
Dielectric Oil, 1 dr. to 2 oz.		Vol. II.
Dietetics		575
Diethylamino propyl Cinnamate		359
Diethyl Ammon.-Diethyl Dithiocarbamate		773
Diethyl barbituric Acid		790
Diethylene-diamine, 4 to 10 gr.		688
Di-ethyl Malonate		791
Di-ethyl-malonyl-urea, 5 to 10 gr.		790
Diethyl-sulfone-methyl-ethyl-methane, 10 to 20 gr.		769
Diffusol		36
Digalen, 5 to 15 m.		412
Digestive Salt		745
Digistrophan Tablets		413
Digitaline, Cryst., $\frac{1}{250}$ to $\frac{1}{100}$ gr.		410
Digitaline, Amorphe, $\frac{1}{60}$ to $\frac{1}{30}$ gr. Granules, 1 mgr.		410
Digitalinum, Nativelle granules, $\frac{1}{240}$ & $\frac{1}{600}$ gr.		411
,, Pulv. Pu., $\frac{1}{10}$ to $\frac{1}{2}$ gr.		412
Digitalis, Folia, $\frac{1}{2}$ to 2 gr.	404 &	V. II
,, Acetone Extractive		Vol. II.
,, Assay		Vol. II.
,, Cultivation, etc.		Vol. II.
,, Cumulative Action		408
,, Flowers and Seeds		Vol. II.
,, Glucosides	410 &	Vol. II.
,, Indian		Vol. II.
,, Physiological Standardisation	409 &	Vol. II.
,, Preservation		Vol. II.
Digitalone, hyp. 8 to 15 m.		409
Digitoxin, $\frac{1}{250}$ to $\frac{1}{64}$ gr. (granules $\frac{1}{4}$ mgr.	411, 412 &	Vol. II.
Di-hydroxybenzene		730
Dihydroxyphenylethyl Methylamine		965
Dihydroxyphthalophenon		672
Di-Iodo Cocaine HI.		346
Di-iodo iso-propyl Alcodol		512
Di-iodo-hydrin		512
Dimethyoxy Emetine		517
Dimethyl-Amido-Antipyrin		335
,, ,, Azo-Benzol		Vol. II.
,, -Amidobenzaldehyde		V. II.
,, Benzol		325
,, Carbinol		130
,, -Ethyl-carbinol		810
,, Ethyl-carbinol,chloral		811
,, Glyoxime		Vol. II.
,, -Ketone, 1–1½ dr.		4
,, Meth-dieth. Sulphone		768
,, Methoxyphenol		24
,, -oxy-quinizine		333
,, Xanthine		778, 780
Dimol Pulverettes, 2 to 4		24, 525
Dinitrobenzols		323
Dinitro-cellulose		364
Dinner Pills and Tablets		693
Diogen (developer *v.* P.J.i./07,429).		
Dionin, $\frac{1}{4}$ to $\frac{1}{2}$ gr.		558
Di-ortho-Aminothio Benzene		772
Diosal Sol.		86
Dioxydiamino-Arsenobenzol		204
Diphenylamine		Vol. II.
,, Eth-thymyl benz.		785
Diphtheria Antitoxin	891 &	Vol. II.
,, 'Conc.' 892; Units	892 &	Vol. II.
,, Endotoxin		Vol. II.
,, Infective Period		976
,, Pigment for		426
,, Prophylactic		893
,, Schick Test for		Vol. II.
,, Toxin-Antitoxin		893
Diplo. Intracellularis		887
,, Neutral Red Medium for		907
,, Rheumaticus		906
,, Still's		887
,, Weichselbaum		887
Diplosal, 15 gr.		80
Diseases Index		1005
Disinfectants	35, 135, 139,	546
,, Sale of		979
,, Standardisation		Vol. II.
,, Summary of Potent.		V. II.
Disinfection of Rooms	135, 139 &	Vol. II.
Disinfector, "Formanganate"		135
Distemper		902
Di-Sod. Methylarsen., $\frac{2}{3}$ to 3 gr.		200
Dita Bark and Ditaine		810
Di-thymol-iodide		500
Di-Ureides		790
Diuretic, the choice of a		405
Diuretin, 10 to 20 gr.		779
,, Lithium, 5 to 15 gr.		779
Divi Divi		827
Doan's Pills and Ointment		Vol. II.
Dobell's Solution		747
Dochmiasis, *see* Ankylostom.		
Dock, Yellow		855
Dogwood, Jamaica	485,	850
Dolichos Pubes		435
Donovan's Sol., 5 to 20 m.		194
"Dope"		451
Doremus Ureometer		Vol. II.
Dormigene, 5 to 10 gr.		794
Dormiol (Caps. 7½ m.) 5 to 50 m.		811
Dorset's Egg Medium		Vol. II.
Doses, Metric, and Imperial		xxxiii
,, Proportions acc. to age		1098
Dose Table Intravenous		1066
Douches, Nasal		285
Dover's Powder, 5 to 15 gr.		515
Drage's Investigations		29
Dragendorff's Test		Vol. II.
Dragon's Blood		827
Drainage Tubing		284
Dressings, Dental, 451; N.H.I., 451; Sterilisation of, 450 & Vol. II.; Steriloid, 449; Surgical, 447 *et seq.*; Preparation of		450
Dreyer's Vaccine		925
Drigalski-Conradi Medium		Vol. II

NAME.	DOSE.	PAGE
Dridustsols	.. ..	120
Droitwich Brine Baths		Vol. II.
Drop Measure Table	..	Vol. II.
Dropwort	.. .. ..	846
Drosera Rotundifolia	.. ..	827
Drug Addiction: Cannabis, 280, 628; Heroin, 559; Opium, 628, 629. (*See* also Cocaine, Morphine, etc.).		
Drugs, Dangerous, Acts	..	983
Dryopteris	.. .. ..	434
Duboisia and Duboisine	225,	494
Ductless Glands. *See* Glands in question.		
Dugong Oil, 618; Dulcitol		Vol. II.
Dum Dum Fever	..	Vol. II.
Dunbar's Hay Fever Serum		897
Dundas Grant's Inhalation Fluid		304
Dunhill's Solution	.. ..	354
Duodenal Membrane Tabs. and Extract, 5 to 20 m.	.. ..	946
,, Ulcer, 927 & Therap. Ind.		
Duotal, 5 to 15 gr.	.. ..	398
Duplitised Films X ray		Vol. II.
Duralumin	.. .. ..	154
Durant's Injection	.. ..	397
Duret's Calomel	..	Vol. II.
Durine	.. ..	135
Dusart's Syrup, 2 to 4 dr., 68; Wine	.. .. ..	Vol. II.
Dusting Powders, Formosyl (*see* also 154, 801)	.. ..	138
Dutch Drops	.. .. ..	688
Duty-free Alcohol	.. ..	130
Dyes, Aniline, 312; for foods		Vol. II.
(*see* also Individual Colors).		
Dysentery, 1026; Serum (Bacilli)	.. Vol. II., 893,	1026
,, Vaccine, 50 to 2,000 mill.		894
,, Amœbæ, Search for	894 &	Vol. II.
,, Treatment (Emetine)	516 *et*	*seq.*
Ipecac.	.. ..	514
,, Carriers, Treatment with E.P.I.	.. ..	522
,, Pathology of	.. ..	524
E.M.F., Vol. II.; Eade's Pills	..	V. II.
'E.P.I.', 2 grs.	.. ..	522
Ear Cones, 233; Cocaine	..	344
Earth Nut Oil	.. .. ..	812
Easton's Syrup (also Pills and Tablets, 432), ½ to 1 dr.	..	431
Eau de Botot	.. .. ..	812
,, de Cologne	.. .. ..	127
,, de Goudron, 5–10 oz.	..	692
,, de Javelle	.. .. ..	50
,, de Labarraque	.. ..	52
,, de Paris	.. .. ..	127
,, de Mellisse des Carmes	..	842
,, Oxygénée	.. .. ..	485
,, Sedative	.. .. ..	277
Ecballium Elaterium	.. ..	827
Ecgonine	.. ..	338 & 983
Echinococcus	.. ..	Vol. II.
Echitamine	.. ..	810
Echium	.. .. ..	827
Ecthol, 1 dr. well diluted	..	864
Eczema Marginatum, Therap. Ind.		
Eczoline Preps.	..	Vol. II.
Edestin	.. .. ..	452
Edmunds' Cell	.. .. ..	36
EFFERVESCENT SALTS.		
("gr." in drachm understood —*dose*, 1 dr. or *q.s.*):		
Acetanilide, 1 and 3 gr.	..	3
Ammon. Brom., 5 gr.	..	156
,, Salicyl., 10 gr.	..	81
Antipyrine, 5, 10, 15 gr.	..	334
Caffeine (base), gr. 3	.. ..	263
,, Citr. 2½ gr. and c. Pot. Brom., 5 gr.	..	263
,, HBr., 2½ gr.	..	264
Carlsbad Salt (Vescettes)	..	754
Catha Phenolphthalein, 1 to 2 dr.	.. .. ..	292
Chloro-Sodio-Mag. Aper.	..	754
Glyceroph., 60 grs.	.. ..	46
Iron & Quin. Citr., 3 gr.	..	710
Lecithin, 3 gr.	.. ..	535
Lithium Citrate	.. ..	537
,, Hippuras, 5 gr.	..	538
,, Salicyl, 2 gr.	.. ..	538
Magnesium Citrate, 1-2 dr. or *q.s.*		
,, *Sulphate*, ½–1 oz.	..	542
Phenacetin, 5 and 10 gr.	..	332
,, 5% et Caffeine, 2½%	.. ..	333
Phenolphthalein, $\frac{1}{10}$ to 2 dr.		673
Pilocarpine, $\frac{1}{10}$ gr.	.. ..	533
Piperazin, 5 gr. (et c. Phenocoll)	.. .. ..	688
Piperidine Tart., 5 gr.	..	689
Potass. Citrate, 1 or 2 dr.		
Potassic Aperient, et c. Pot. Sulphocarb.	.. ..	702
Quin. Citrate, 1 gr.	.. ..	710
,, Salicyl., 3 gr.	.. ..	719
,, Sulphate, 2 gr.	.. ..	726
Sal Bromatum	.. ..	746
Salicin, 5 gr.	.. .. ..	94
Salicyl. Acid, 5 gr.	.. ..	80
Sodio-Mag. Aper. (et c. Caffein, 754)	.. .. ..	754
Sodium Benzoate, 6 gr. in dr.		10
,, *Citro-Tart.*, 1 or 2 dr.		
Sodium Phosphate, 1 to 3 dr.		751
,, Salicyl., 5, 10 grs.	..	85
,, Sulphate, 1 dr. or more		726
Stront. Brom., 10 gr.	..	762
Sulphonal, 5 gr.	.. ..	769
Tylcalsin, 5 gr.	.. ..	92
Tyllithin, 5 gr.	.. ..	92
Vesalvine 5 gr.	.. ..	457
Egg Medium and Yellow		Vol. II.
"Ehrlich-Hata"	.. ..	204
Ehrlich Stains and Tests		Vol. II.
Ektogan	.. .. ..	487
El Kossam	.. .. ..	816

NAME. DOSE.	PAGE
Elæosacchara, P.G. (*q.v.*).	
Elastica	284
Elastic Hosiery..	284
Elaterinum, 1–40 to 1–10 gr...	827
Elaterium, 1–10 to ½ gr. ..	827
Elderberry Flowers	855
Elecampane	836
Electrargol	388
Electrocuprol	387
Electr. Hydrarg.	387
Electro Palladiol	388
,, Platinol	388
,, Selenium	388
Electric Currents Injuries ..	1068
Electricity, Medical ..	Vol. II.
Electrolytes	Vol. II.
Electromotive Force ..	Vol. II
Electuaire Diascord., 15 gr. ..	863
Elements, Table of ..	Vol. II.
Elephantiasis, *see* Filariasis Therap. Ind. &	Vol.II
Elettaria Cardam	819
Elixirs	413
Elixir Acetanilid. Co., ½ to 1 dr.	3
,, Acidi Salicyl. Co., 1 dr...	78
,, Agrimoniæ Co., 1 dr. ..	808
,, Aletridis, ½ to 1 dr. ..	808
,, Ammon. Brom., 1 to 2 dr.	156
,, Anascarcin, 4 dr. ..	702
,, Antim. Cinnam., 1–2 dr.	174
,, Antineuralg., 1–2 dr. ..	262
,, Aperitive, ½ to 1 dr. ..	150
,, Aromat., ½ to 2 dr. ..	413
,, Arsamin (½ gr.), 1 dr. ..	202
,, Aurantii Amari, 2 to 4 dr.	413
,, Berberinæ, 1 to 4 dr. ..	816
,, Bismuthi, 60 m... ..	242
,, Caffeinæ, 1 to 2 dr. ..	262
,, Calc. Chlor., 1–2 dr. ..	272
,, ,, Iodidi, 1 dr. ..	273
,, Camph., 30 to 60 m. ..	277
,, ,, Monobr., 4 dr. .	279
,, Cascara, 30–120 m. ..	289
,, Chloralamidi, 1 oz. ..	297
,, Cinchonæ, 30 to 60 m. .	309
,, Cinchonidine, ½ oz. ..	707
,, Cocæ, 1 to 4 dr... ..	338
,, Creosoti, 1 to 2 dr. ..	393
,, Curacao, 2 to 4 dr. ..	413
,, Duodenalis, ½ oz.. ..	946
,, Ergotæ cum Ferro, 2 dr..	420
,, Ferri Phosph., c. Quin et Strych., ½ to 1 dr. ..	432
,, Ferro-Mang. Pept., 1 to 4 dr.	428
,, Ficorum, 1 to 4 dr. ..	413
,, Formatum, Co., 1 to 2 dr.	40
,, Four Gland, 1 to 2 dr...	970
,, Gentian Ac., 1 to 2 gr...	831
,, Glusidi, 5 to 20 m. ..	732
,, Glyceroph., 1 to 4 dr...	46
,, ,, c. Format., 1–2 dr.	47
,, Guaiaci, 1 to 2 dr. ..	453
,, Hæmoglobin, 1 dr. or more	578
,, ,, c. Lecithin, 1 to 2 dr.	578

NAME. DOSE.	PAGE
Elixir Heroin, Pini et Terpin, 1 dr.	687
,, Ipecacuanhæ, 10 to 30 m.	515
,, Lecithin, 2 dr.	535
,, Lith. Hydrangea, 1 to 2 dr.	834
,, Manaca Salicyl, 1 to 2 dr.	841
,, Papain, 1 dr.	650
,, Paraldehyde, 1 to 3 dr...	133
,, Paregoric, ½ to 1 dr. ..	630
,, Pectorale, 1 dr... ..	832
,, Pepsin, Bism., Strych.,1 dr.	661
,, Pepticus, ½ oz.	660
,, Phosphori, 15–60 m. ..	676
,, Pini et Terpin Sim., 1 dr.	687
,, Pini, Terpin et Heroin, 1 dr.	687
,, Quinque Brom., 1 dr. ..	696
,, Quinidine, ½ oz... ..	706
,, et Cinchon., ½ oz. ..	707
,, Rhei, 1 to 3 dr... ..	413
,, Rubrum, 20–60 m. ..	413
,, Saccharini, 5 to 20 m...	732
,, Secretogen, 1 to 2 dr...	947
,, Sennæ (et Legum.), 1 to 3 dr.	858
,, Simplex, 20–60 m. ..	413
,, Sodii Brom-aceto salicylat., ½ oz. rep... ..	88
,, Sodii Cacodyl., 30 m. ..	200
,, ,, Formatis, 2 dr. ..	40
,, ,, Lact., 1 dr.. ..	68
,, Symphyti, ½ to 2 dr. ..	862
,, Three Gland, 1 to 2 dr...	970
,, Thymi et Diaphorm, 1 dr.	864
,, Vesalvine 'S,' 1 dr. ..	458
,, Vitæ, 20 m.	842
,, Vanillin Co., ½ to 1 dr...	865
,, Viburn. Prunif. (&Co.) ..	866
,, *of Vitriol*, 5–20 m. ..	103
Elixoid Mucin, 1 to 4 dr. ..	948
Elm	864
Embalmment of Wounds. ..	499
Embelia, 1 to 4 dr.	827
Emblic Myrobalans, 1 or 2 ..	827
Emetamine	531
Emetina (Alk.) .. 516 &	Vol. II.
,, Oleate, ¼ gr.	526
,, Periodide, 2 grs. . 148,	522
,, ,, Slipules 2 gr. 522,	527
,, ,, Discussion on paper	528
,, Adsorption Products ..	531
,, HBr. Hyp., ½ to ⅔ gr. ..	520
,, HCl. Expect $\frac{1}{100}$ to $\frac{1}{25}$ gr.	516
,, ,, Hyp., ½ to ⅔ gr. ..	
,, Steriloids	144
Emetin (Extractive) Expect $\frac{1}{16}$ to $\frac{1}{10}$, Emetic, ½ to 1 gr...	531
Emetine and Amœbæ 517	*et seq.*
,, Bismuth Iodide, 1 to 3 gr.. 520 &	Vol. II.
,, Diarrhœa	521
Emetique, Max. single, 3 gr...	174
Emetol, 2 dr.	525
Emodin 830,	858
Empirin, 5 to 15 gr.	86
Emplast. Ac. Salicyl. Sap. ..	78

NAME.	DOSE.	PAGE
Emplast Adhesivum	.. ..	603
,, ,, Ang.	.. ..	835
,, Allii	.. .. ..	809
,, *Belladonnæ*, 236; U.S.		237
,, ,, Extensum	..	237
,, *Calefaciens*	.. ..	282
,, *Cantharidini*	.. ..	282
,, Cantharidis Liq.	..	282
,, Capsici (various)	..	286
,, Cocainæ	.. ..	341
,, Cupri Oleatis	.. ..	602
,, Diachylon	.. ..	603
,, Hydrarg. Stearatis	..	603
,, *Menthol.*	.. ..	550
,, Methyl Salicyl.	..	80
,, Mouches de Milan (Emplatre)	.. ..	282
,, Opii	.. .. ..	629
,, *Plumbi*	.. ..	603
,, *Resinæ*	.. ..	603
,, *Saponis*	.. ..	603
,, Vesicans	.. ..	282
Emulsin	.. .. ..	163
Emuls. Amygdalæ, av. 4 oz.		164
,, Asafœtidæ, 4 dr.	..	813
,, Barii et Bism.	.. ..	235
,, Benzyl Benz., ½ to 2 dr.		324
,, Bismuthi et Paraffini, 1 oz.	.. .. ..	655
,, Bromoform, 2 to 4 dr.	..	259
,, Chloroformi	.. ..	305
,, Butol	.. .. ..	598
,, Iodinol, 2 dr.	.. ..	504
,, Iodoformi	.. ..	498
,, Lecithin, ½ oz.	.. ..	535
,, Ol. Arachis c. Glucose	..	598
,, Ol. Chaulmoograe, ½ to 1 dr.	.. .. ..	607
,, Olei Papaveris, ½ to 1 oz.		620
,, ,, Gynocardii, ½ to 1 dr.		607
,, ,, Morrhuæ, 2 to 8 dr.		617
,, ,, Ferrat,. 2 to 8 dr.	..	617
,, ,, c. Lecithin, 2 to 8 dr		617
,, ,, Morrhuæ et Glyceroph., 2 to 8 dr.	..	47
,, Morrhuæ et Hypoph., 2 to 8 dr.	.. ..	617
,, Morrh. et Iodoform, 2 to 8 dr.	.. ..	617
,, Ol. Olivæ, 1 to 2 oz.	..	619
,, ,, Paraffini et Bismuth, 1 oz.	.. ..	655
,, ,, Pancreatino, 2 to 4 dr.		655
,, ,, Rhamni Frang., ½ to 1 oz.	.. ..	656
,, ,, Petrolei c. Hypoph., 1 to 4 dr.	..	654
,, ,, Salol, ½ to 1 oz.	..	95
,, ,, Santonin	.. ..	735
,, ,, Seminum Cannabis		817
,, ,, Sesami, 2 to 3 oz. *p.d.*		625
,, ,, Sevi	.. .. ..	598
,, ,, Sulphuris	.. ..	906
,, ,, Terebinth., 1 dr.	..	686
Encephalitis lethargica.	..	1028
Endocarditis Serum	.. ..	908
Endolytic Tubes	..	Vol. II.
Endocrine Glands	.. ..	944
Enemata	.. .. ..	414
Enema, Acid Salicyl. 0·3%	..	415
,, Alum, 0·5%	.. ..	415
,, Ammoniæ	.. ..	160
,, Aperiens	.. .. ..	415
,, Argent. Nit., 0·1%	..	415
,, Asafœtidæ, 5%	..	415, 813
,, Barii Sulphatis	.. ..	235
,, Bismuth Carb. or Subnit., 1%	.. .. ..	415
,, ,, Sod. Salicyl., 1 pint	..	248
,, Boric Acid. Sat. Sol.	..	415
,, Chloral, 4 oz.	.. ..	296
,, Cresol (preparations), 0·5 to 1%	.. .. ..	415
,, Dextrose	.. .. ..	414
,, Evacuans	.. .. ..	415
,, Ferri Chloridi (Liq.), 2%		415
,, Glycerin, ½ oz.	.. ..	415
,, Hyd. Perchlor., 0·01 to 0·05%	.. .. ..	415
,, Inf. Allii	.. .. ..	415
,, Mag. Sulph., ½ to 2 oz.	..	542
,, Mucilaginis, 25%.	..	415
,, Nutriens	.. ..	414
,, Olei Terebinth., 0·5 to 1%		415, 686
,, Oleosum	.. .. ..	618
,, Opii	.. .. ..	415
,, Plumbi Acet., 1%	..	415
,, Silver Gelatose	.. ..	190
,, Simplex	.. .. ..	415
,, Sodii Chloridi	.. ..	745
,, Stimulant, for Thirst, etc.		414, 415
,, Tannin, 1%	.. ..	415
Enesol (injected), 1 gr. in 30 m.		201
Eno's Fruit Salt	..	Vol. II.
Ens Melissa	.. .. ..	842
Entada Scandens	.. ..	828
Entamœba Cysts, Search for		519 & Vol. II.
,, Buccalis	..	906
,, Coli	.. ..	Vol. II.
,, histolytica	517 *et seq.*	& Vol. II.
,, Nana	..	Vol. II.
Enteric Fever. *See* Typhoid.		
Enterococcus	.. ..	Vol. II.
Enzyme Action	.. ..	543, 660
,, Artificial	.. ..	370
,, Table of	..	Vol. II.
Enzymol	.. .. ..	661
Enzytol, 3 to 20 Cc. dil.	..	7
Eosin Stains (various)	..	Vol. II.
Eosote, 5 - 10 m.	.. ..	396
Eparsneo	.. .. ..	216
Ephedrine	.. .. ..	828
Epilepsy: Luminal 795 & Ther. Ind.	.. ..	1029
Epinephrin	.. .. ..	960
Epinene	.. ..	965

NAME.	DOSE.	PAGE
Epsom Salts (Mag. Sulph.)	..	540
Equisetum Arvense	.. ..	828
Erasmus Wilson's Lotion	..	160
Erdmann's Test	..	Vol. II.
Ergamine	.. .. ..	418
Ergoapiol	.. .. ..	182
Ergot, 15 to 60 gr.	415 &	Vol. II.
Ergot Aseptic	.. .. ..	417
,, of Maize	.. .. ..	841
,, Physiol, Standardised		Vol. II.
Ergotin, 2 to 8 gr.	.. ..	417
Ergotinine Cristallisée, 1/200 to 1/64 gr.	.. ..	417
,, Cit., 1/150 to 1/30 gr.		418
Ergotoxine, 1/100–1/50 gr.	..	418
Ergoval, 10 to 30 m. or 60 m.	..	416
Eriodictyon	.. .. ..	867
Erica, Ericolin	.. ..	Vol. II.
Erigeron Can.	.. .. ..	828
Ernutin, 30 to 60 m.	.. ..	418
Erodium	.. .. ..	828
Erucæ Semina (Sinapis)	..	738
Eryngium	.. .. ..	828
Erysipelas Dressing, 802; Serum		908
Erysimum	.. .. ..	828
Erythro-Selenium	.. ..	388
Erythrol Nitrate, ½ to 1 gr.	incr.	420
Erythrophlœinæ Sulph., 1/40 to 1/24 gr.	.. .. ..	422
Erythrosins	.. ..	Vol. II.
Erythrotetranitral, ½ to 1 gr.	incr.	420
Erythroxylum Coca, 30 to 120 gr.	.. ..	337
Esanofele	.. .. ..	797
Esbach's Picric Solution		Vol. II.
Eserina, $\frac{1}{100}$ to $\frac{1}{50}$ gr.	.. ..	681
Eserinæ Salicyl., 681; *Sulph.*, 1/60 to 1/20 gr.	.. ..	681
Esprit *var*, vide Spiritus	..	—
,, Ammonia. Anisat	..	832
Esparto	.. ..	828
Espundia	.. ..	Vol. II.
Essence of Beef	.. ..	576
Essence of Ginger, 868; Vanilla		865
,, ,, Rennet	.. ..	659
Essentia Anisi, '85, 10 to 20 m.; Menth. Pip., '85, 10 to 20 m.; Yerba Buena (Ph. Notes) = Mentha Sativa.		
Essential Oils as Antiseptics	..	600
,, ,, Terpeneless		Vol. II.
Esterol Stearns	.. ..	325
Ethanesal	.. .. ..	113
Ether	.. ..	112
,, Chloric	.. .. ..	305
,, Green	.. .. ..	297
,, Méthylénique et Diméthylique de l'Allyl-apionol		181
,, Ozonic	.. .. ..	487
,, Perles 3 m. in each	..	118
,, Soap, et c. Merc. Iodide	..	737
,, with Atropine	.. ..	116
,, with Olive Oil	.. ..	117
,, with Oxygen and Alcohol		114
,, with Oxygen and Gas	..	114

NAME.	DOSE.	PAGE
Ether with Paraff. Liq. Oral use		118
,, with Saline	.. ..	116
v. also Æther.		
Ethocaine HCl., 1/5 to 1 gr.	..	353
Ethoxymeth. Sal.	.. ..	80
Ethyl Acetate	.. .. ..	119
,, Alcohol	.. ..	122
,, Amido-benzoate	..	355
,, Bromide (Caps. 5 m.)	..	807
,, Butyrate	.. ..	811
,, Carbamate, 10 to 60 gr.		796
,, *Chloridum*	.. ..	119
,, ,, Dangers	.. ..	120
,, ,, Inhaler	.. ..	119
,, ,, Medictd. Solns.	..	120
,, Esters Chaulmoogra 1 Cc. intram.	.. ..	610
,, Group effect of	..	Vol. II.
,, Hydro Cupreine, *Base* 3 to 4 gr., 400; HCl., 3 to 4 gr.	.. ..	400
,, Iodide	.. .. ..	121
,, ,, Sterules, 5 m.	..	121
,, ,, c. Chlorof. Sterules	..	122
,, Morphine (Base)	..	559
,, ,, HCl., ¼ to ½ gr.	..	558
,, *Nitrite Sol.*, 15 to 60 m.		119
,, Oxide, 112; Salicyl	..	80
Ethylene	.. .. ..	305
,, Bromide, 1 to 2 m.	..	807
,, Dichlor	.. ..	306
Eucaine HCl. B, 1/10–½ gr.	..	350
,, Ionised	..	Vol. II.
,, *Lact.* B, ⅛ to ½ gr.	..	351
,, c. Adrenalin	.. ..	351
,, Slipules	.. ..	351
Eucalypti Folia, 5 gr	.. ..	613
,, *Gummi*, 2–5 gr.	..	828
Eucalyptol, 1 to 4 m.	..	614
,, Chlorinated	..	62
,, Phosphate, 1 to 5 gr.		614
Eucerin	.. .. ..	788
Euchlorine Gargle	.. ..	748
Eucodeine, ¾ gr.	.. ..	362
Euflavine and Tablets	.. ..	320
Eugallol	.. .. ..	77
Eugenol	.. .. 422, 819,	829
Eumenthol Jujubes	.. ..	615
Eumydrine	.. .. ..	232
Eunatrol	.. .. ..	736
Euonymi Cortex	.. ..	422
Euonymin, 1 to 2 gr.	.. ..	422
Eupad	.. .. ..	53, 56
Eupatorium	.. .. ..	829
Euphorbia Pil, 829; Peplus	..	829
Eupnine, 1 dr.	.. .. ..	265
Euquinine, 3 to 15 gr.	..	728
Euresol, 731; Eurobin	..	308
Eusol	.. ..	53
,, Assay	.. ..	Vol. II.
,, Bactericidal Power		Vol. II.
,, Intravenous Use	.. ..	55
,, Uses, 52; Cordova's Modif.		56
Eustachian Self-Inflator	..	304
Eustenin, 8 to 15 gr.	.. ..	780

NAME.	DOSE.	PAGE
Evatmine.	.. .. ..	961
Evonymine	.. .. ..	422
Ewald's Breakfast	..	Vol. II.
Exalgine, ½ to 2 gr.	.. ..	4
Exibard's Pdr.	.. .. ..	702
Excise Duty	.. .. ..	123
Exogonium	.. .. ..	836
Extracta:		
	(*vide also Fluidextr*).	
,,	Acocantheræ Liq. max. 4 m. (?)	806
,,	Aconiti Rad. Alc., max. ½ gr.	108
,,	Agarici, ½ to 2 gr. ..	808
,,	*Agropyri Liq.*, 1 to 2 dr.	808
,,	Aletridis, Liq., 5 to 15 m.	808
,,	Allii, 4 to 10 gr. ..	808
,,	Alni Glutinosæ Liq., 10 to 30 m.	810
,,	*Aloes*, 1 to 4 gr.	149
,,	,, Barb. and Soc. ..	149
,,	Anthemidis, 2 to 8 gr. ..	812
,,	Apocyni Liq., 15 m. ..	182
,,	*Belæ Liq.*, 1 to 2 dr. ..	816
,,	*Bellad .Sicc.*, ¼–1 gr.	237 & V. II.
,,	Bellad. Fol., av. ¼ gr. ..	237
,,	,, *Liq.*, ⅓–1 m. ..	237
,,	,, Viride, ¼ to 1 gr.	237 & V.II.
,,	Bone Marrow, 1–2 dr. ..	944
,,	Brain, 5 to 10 m. ..	945
,,	Buchu Liq. 30 m.. ..	260
,,	Bynes (and Liq.), 1 to 4 dr.	542, 543
,,	Cacti Grandi. Liq., 1 to 10 m.	821
,,	Calumbæ, '85, 2–10 gr. ..	—
,,	*Cannabis Ind.* ¼–1 gr. ..	280
,,	,, Liq., 1½ m.	281
,,	Capsici Liq., 1 m. ..	287
,,	Carnis	575
,,	*Cascaræ Sag.*, 2 to 8 gr. ..	289
,,	*Cascaræ Sagradæ Liq.*, 30 to 60 m.	289
,,	Cascara Aromat. Liq., 30 to 60 m.	290
,,	Catha Solid., 2½ to 10 gr..	291
,,	,, Liq., 1 to 5 m. ..	292
,,	Caulophylli Liq., 8 m. ..	820
,,	Cerebri Liq., 5–10 m. ..	945
,,	,, Recent, 2 to 4 dr. ..	945
,,	Cerevis, Ferment, 3 gr. ..	293
,,	Chekan, Liq., ½–3 dr. ..	822
,,	Chelid. Liq., 10 to 30 m...	822
,,	Chenopodii Liq., ½ to 1 dr.	822
,,	Chinæ, 1 to 4 gr.	309
,,	Chiratæ Liq., 15 m. ..	823
,,	Cigue, ¾ gr.	391
,,	Cimicifugæ Liq., 5–30 m.	823
,,	*Cinchonæ Liq.*, 5–15 m.	309 & Vol. II.
,,	Cocæ, 2 to 15 gr. . ..	338
,,	,, Liq., ½—1 dr. ..	338
,,	*Colchici*, ¼ to 1 gr. ..	363
,,	Collinson, Liq., 15 to 30 m.	824
Ext.	Colocynth., av. ¼ gr. ..	390
,,	*Colocynth. Comp.*, 2 to 8 gr.	390
,,	Condurango Liq., 10 to 60 m.	824
,,	Conii, max. ¾gr. Fr. Cx.	391
,,	,, Liq., 5 to 15 m. ..	391
,,	Convallariæ, 2–8 gr. ..	824
,,	Corn Silk, Liq. 1 dr. ..	841
,,	Coto Liq., 2 to 6 m. ..	392
,,	Cyperi Rot. Liq., 15 to 60 m.	826
,,	Damianæ, 2 to 10 gr.; Liq., ½ to 1 dr. ..	827
,,	Digitalis, Fr. Cx. (U.S., av., ¼ gr.)	408
,,	d'Orges	542
,,	Dulcamara	859
,,	Duodenal Liq., 5 to 20 m.	946
,,	*Ergotæ*, 2 to 8 gr. ..	417
,,	,, *Liq.*, 10–30 m. ..	416
,,	,, Phys. Stand. ..	416
,,	Erigeron Liq., 30–60 m. ..	828
,,	Erodii Liq., 15 m. ..	828
,,	Erythroxyli Liq., ½–1 dr.	338
,,	Eucalypti Gum. Liq., 30 to 60 m.	828
,,	*Euonymi* 1 to 2 gr. ..	422
,,	,, Liq., 10 to 60 m. ..	423
,,	Eupatorii Liq., 30 m. ..	829
,,	Euphorbiæ Pepli, 7½ to 30 gr.	829
,,	Euphorbiæ Pil., ½ to 1½ gr.	829
,,	Eye, 2 dr.	947
,,	Fæxin, 3 gr.	293
,,	Ferri Pomatum	429
,,	*Filicis Liq.*, 45-90 m. ..	434
,,	Frangulæ Liq., 1–4 dr. ..	830
,,	Fuci Vesic., 3 to 10 gr.	830
,,	Liq., 1 to 2 dr. ..	830
,,	Fungi Secalis Liq. ..	416
,,	Galii, 5 to 20 gr.	831
,,	Gelsem Liq., ½ m. ..	437
,,	Gelsem. Pulv., ½–2 gr. ..	437
,,	*Gentianæ*, 2 to 8 gr. ..	831
,,	Glaucii Liq., 1 dr. ..	831
,,	*Glycyrrhizæ*, 5–60 gr. ..	832
,,	,, *Liq.*, 30–60 m. ..	832
,,	Gokhru Liq., 20-60 m. ..	832
,,	Gossypii, 1 to 4 gr. ..	452
,,	,, *Liq.*, ½ to 1 dr. ..	452
,,	,, Sem., 1 dr.	452
,,	Granati Liq., 30 m. ..	659
,,	Grindeliæ, 2 to 3 gr. ..	452
,,	,, *Liq.*, 10 to 20 m ..	452
,,	,, Co., 1 dr.	453
,,	Hæmatoxyli Liq. (& Solid, av. 15 gr.), ½ to 2 dr. ..	833
,,	Hæmostatic	417
,,	Hamamelidis Dest., ½ to 3 dr.	454
,,	,, *Liq.*, 5–15 m. ..	454
,,	Helenii	836
,,	Hippocast Liq.	806
,,	Holarrhenæ Liq.	834
,,	Humuli, 2 to 6 gr. ..	840

NAME.	DOSE.	PAGE
Ext. Hydrastis, 2 to 5 gr.	..	484
,, ,, *Liq.*, 5–15 m.	..	483
,, *Hyoscy.*, 2 to 8 gr.	..	492
,, Viride, 2–8 gr.	..	492
,, Hypophysis, ½ to 1 Cc.	..	953
,, Hysterionicæ Liq., 5 to 15 m.	.. .. ..	835
,, Infundibular, ½ to 1 Cc.	..	953
,, Inulæ Liq., 10–60 m.	..	836
,, Ipecac.	.. .. ..	515
,, *Ipecac. Liq.*	Expectorant ½ to 2 m. Emetic, 15 to 20 m. ('98)	515
,, Iridis	.. .. ..	836
,, Jaborandi 2 to 10 gr., (B.P. '85)	.. ..	
,, ,, Liq., 5 to 15 m.	..	532
,, Jalapæ 2 to 8 gr.	..	836
,, Kavæ, 5 to 10 gr.	..	838
,, ,, *Liq.*, 30 to 60 m.	..	838
,, Kidney	.. .. ..	947
,, Kolæ Liq., 10–20 m.	..	266
,, *Krameriæ*, 5–15 gr.; Liq. 15 m.	.. .. ..	838
,, Lactucæ, 85, 5–15 gr.	..	
,, Lappæ Liq. 30 m.	..	839
,, Lasiosiphon Liq., 2 to 5 m.		839
,, Leptandræ, av. 4 gr.	..	839
,, Leeches	.. .. ..	947
,, Liver	.. .. ..	947
,, Lupuli, 2 to 6 gr.	.. ..	840
,, ,, Liq., 5 to 15 m.	..	840
,, Maidis Stig. Liq., 1 dr.	..	841
,, ,, Ustil. Liq., ½ to 2 dr.		841
,, Malti (& Liq.), 1 to 4 dr.		542, 543
,, ,, Ferratum	.. ..	544
,, ,, c. Cascara	.. ..	544
,, ,, c. Hæmoglobin	..	544
,, ,, c. Hypophos.	..	543
,, ,, c. ,, c. Ol. Morrhuæ	..	543
,, ,, c. Glyceroph.	..	46
,, ,, c. Iodinol (1 oz. dose)	..	
,, ,, c. Oleo Morrhuæ	..	544
,, ,, c. Pancreatin	..	544
,, Malti Sicc., 1 to 2 dr.	..	544
,, ,, c. Syr. Ferri Phosph., 1 to 4 dr.	..	544
,, ,, Paraff.	.. ..	543
,, Manaca Liq., 10–30 m.	..	841
,, Meat	.. .. ..	575
,, Menyanthis Liq., ½ oz.	..	842
,, Mezereon Liq.	.. ..	843
,, Monsoniæ Liq., 10 to 30 m.		843
,, Muira Puama	.. ..	844
,, Myrtilli Liq. 2 ozs. p.d.	..	844
,, *Nucis Vom.*, ¼ to 1 gr.	..	599
,, ,, ,, *Liq.*, 1 to 3 m.		599 & V.II.
,, *Opii Siccum* (20% Morph.), ¼ to 1 gr.	..	629
,, ,, *Liq.* (0·75% Morph.), 5 to 30 m.	.. ..	630

Dose 1 to 4 dr.

NAME.	DOSE.	PAGE
Ext. Papaveris, 85, 2 to 5 gr.		
,, Pareiræ Liq., 30 to 120 m.		848
,, Physostigmat., ¼ to 1 gr.		680
,, Pichi Liq., 10 to 60 m.	..	849
,, *Picorrhizæ Liq.*, 15 to 60m.		849
,, Pini Canad. Liq., 10 to 60m.		850
,, ,, Sylvestris	.. ..	687
,, Piscidiæ, 2 to 5 gr.; Liq. 20 to 120 m.	.. ..	850
,, Pituitary Gland *Infund* ½ to 1 Cc	.. ..	953
,, ,, *Entire* Gland ½ to 1 Cc.	.. ..	952
,, ,, *Ant.* lobe, 1 Cc.	..	952
,, Pulsatilla Liq., 2 to 5 m.	..	851
,, Quassiæ, 3 to 5 gr. 852, Liq.		852
,, Quebracho Liq., 5 to 10 m.		853
,, Quillaia	.. .. ..	853
,, Quinquina Rouge Liq.	..	310
,, Red BoneMarrow, 1 to 2 dr.		944
,, Renal	.. .. ..	947
,, Retinale, 2 dr.	.. ..	947
,, Rhamni Frang., 15 to 60 gr.; Liq., 1 to 4 dr.	..	830
,, ,, Pursh., av. 4 gr.	..	289
,, ,, ,, Fluid	..	289
,, Gelsem Liq., ½ m.	..	437
,, Kidney	.. .. ..	947
,, Leeches	.. .. ..	947
,, Lwer	.. .. ..	947
,, *Rhei*, 2 to 8 gr.	.. ..	853
,, Rhois Aromat. Liq., 10 to 30 m.	.. .. ..	854
,, Rice Polishings	590 &	V. II.
,, Rubi Chamæmori Liq., ½ to 1 dr.	.. ..	854
,, Salicis Nig. Liq., ¼ to 1 dr.		855
,, ,, Solid, 1 to 5 gr.	..	855
,, Sanguinariæ, Liq., 1½ m.		855
,, Sansivieræ. 10–20 gr.; Liq., 2 to 4 dr.	..	856
,, Sarsæ Liq., 2 to 4 dr.	..	856
,, Saw Palmetto, 3–5 gr.; Liq., ½ to 2 dr.	.. ..	856
,, Scillæ	.. .. ..	857
,, Scutellaria Liq., 5 to 15 m.		857
,, Secretin, 5 to 20 m.	..	946
,, Senecio, Liq., 20–60 m.	..	858
,, Sennæ Leg. Liq., 1–3 dr.	..	858
,, Serpentar Liq., 5 to 15 m.		859
,, Solani Tub. Liq., 1 to 4 dr.		859
,, Sorbi Liq., 10 to 30 m.	..	859
,, Spinal Cord, 5-20 m.	..	945
,, Stramonii, ¼ to 1 gr.	..	761
,, Strawberry Eth.	..	830
,, *Strophanthi*, ¼–1 gr.	..	764
,, Strychni, ¼ to 1 gr.	..	599
,, Sumbul Liq. U.S., av. 30 m.	.. ..	862
,, Super-renal Liq. 10 to 15 m.		959
,, ,, Sicc., ½ to 3 gr.	..	959
,, Symphiti, 5 to 10 gr.	..	862
,, ,, Liq., 2 to 4 dr.	..	862

NAME.	DOSE.	PAGE
Ext. Tanaceti Liq.,	15–30 m. ..	863
,, *Taraxaci*,	5 to 15 gr. ..	863
,, ,, Liq.,	½ to 2 dr. ..	863
,, Tebaiaco,	½ to 1 gr. ..	629
,, Thymi. Liq,	5 to 30 m. ..	864
,, Thymus Gland,	½–2 dr. ..	966
,, Thyroid = Thyroid Sicc., 969; Liq. Thyroid ..		968 & Vol. II.
,, Tritici Liq.,	1–2 dr. ..	808
,, Uvæ Ursi Liq.,	20 to 40 m.	813
,, Valerianæ (Liq., 30 m.),	1 to 5 gr.	797
,, Viburni Prunif.,	2 to 10 gr., *Liq.*, 60 to 120 m.	866
,, Vincæ Majoris Liq.,	1 to 2 dr.	866
,, Violæ Liq.,	1 dr. . ..	866
,, Yeast		292
,, Yerbæ Santæ,	10 to 40 m.	867
Eye Bottles, 228; ¶ Douches, 285 Extract, 947; Lotion Cocaine (Factory), 341 & Lotion Isotonic, 344; Operation Sets, 450; Pads, 448; Rods ..		228
Fæces Exam. of ..		Vol. II.
Faex Medicinalis,	½ to 1 oz. ..	292
Fæxin,	1 dr..	292
Fæxin, Extr. Pills,	3 gr. ..	293
,, Extr. Tablets,	3 gr. ..	293
Faivre's Cachets		266
Fats, 600; Iodine, No. of Melting Points Saponifcn. Figs.		Vol. II.
Fatty Acids unsaturated ..		616
Favus		Vol. II.
Fehling's Solution and Modifications		V. II.
Felamine		459
Fel Bovinum Purif.,	5–15 gr. ..	423
,, Exsicc.,	5 to 10gr.	423
Fellows' Syrup of Hypophosphites, medium adult,	1 dr.	679 & V. II.
Felt, 448; *Fennel*		829
Fer Ascoli, 854; Fermenlactyl		69
Ferments, Metallic		370
Ferri Alginas,	2 to 15 gr. ..	808
,, Arsenas,	1/16 to ¼ gr. ..	195
,, Cacodylas,	⅜ to 5 gr. ..	198
,, *Carb. Sacch.*,	10–30 gr. ..	424
,, ,, Conc.		424
,, Chlorid., U.S. = Ferri Perchlor		425
,, Citras, U.S.,	av. 4 gr. ..	424
,, *et Ammon.* Cit.,	5 to 10 gr.	425
,, ,, Virid.,	5 to 10 gr. ..	425
,, ,, Sulph.,	3 to 10 gr.	433
,, ,, Tart., U.S.,	4 gr. ..	433
,, et Mag. Sulph.,	2 to 10 gr...	433
,, ,, Mang. Citras,	3 to 15 gr.	433
,, ,, *Potass. Tart.*,	5 to 10 gr.	433
,, ,, *Quin, Citras*,	5–10 gr.	710
,, ,, ,, Eff.,	3 grs. ..	710
Ferri, Quin. et Strych. Cit.	3 to 6 gr.	766
,, ,, Strych. Cit.,	2 gr. ..	765
,, Fluoridum,	1/20 to ½ gr. ..	805
,, Formas,	1½ to 3 gr. ..	40
,, Glyceroph.,	1 to 5 gr. ..	43
,, Hydrox.		371
,, ,, c. Mag. Ox.		192, 425
,, Hypophosph.,	1–5 gr. ..	678
,, Iodidum,	1 to 5 gr. ..	429
,, Iodid. Sacch.,	2–15 gr. ..	429
,, Lactas,	1 to 5 gr... ..	68
,, Lactoph. et Calcii (Syrup)		68
,, Nucleinas,	15 gr.	428
,, Oleas,	5 to 15 gr. . ..	605
,, Oxalas,	1 to 5 gr. ..	430
,, Oxydat. Sacch.,	10 to 40 gr.	427
,, Oxypersulphas (Monsel's)		433
,, Peptonat,	428; Liq., 1–4 dr.	428
,, Perchlor. (wool, 426),	2–8 gr.	425
,, *Phosphas Saccharatus*,	5 to 10 gr.	430
,, ,, Solubilis,	4 gr. ..	430
,, Pyrophosph., U.S.,	4 gr.	430
,, Salicylas,	3 to 10 gr. ..	81
,, Sesquichlor		425
,, Subsulph		433
,, Succinas		103
,, Sulphanilas		321
,, *Sulphas* (Granulat., U.S.),	1 to 5 gr. ..	432
,, ,, *Exsicc.*,	½ to 3 gr. ..	433
,, Valerianas,	3 to 15 gr. ..	797
Ferrier's Snuff		248
Ferrinol,	15 gr.	428
Ferropyrin		335
Ferrivine		321
Ferro-Alumen,	3 to 10 gr. ..	433
Ferrocarnis,	1 dr.	576
Ferrocyanic Test Pellets ..		V. II.
Ferro Mang. Phosph.,	3 to 10 gr.	545
Ferropyrin,	3 to 8 gr. ..	335
Ferro-sajodin Tabs.,	7½ gr. ..	513
Ferro-Silicon		V. II.
Ferruginous Ampoules ..		47
Ferrum		424 & V.II.
,, Oxydat, Sacch.,	10 to 40 gr.	427
,, *Redactum*,	1 to 5 gr. ..	424
,, *Tartaratum*,	5 to 10 gr. ..	433
Fett-Ponceau R.		326
Fever see Diseases in question, also Table, p. 976.		
Fever as a Salutory reaction ..		311
Feva Powders		725
Fevillea		829
Fibrin		Vol. II.
Fibro-coumarin Sterules,	25 m.	31
Fibrolysan		739
Fibrolysin,	1 to 2 Cc.	739
Ficus Carica		829
Filaria .. Therap. Ind. &		V. II.
Filicin		434

NAME.	DOSE.	PAGE
Filix Mas	.. .. ..	434
Filter passing Influenza Virus		901, 902
Finger Stalls	.. .. ..	285
Finsen Reyn Lamp	.. ..	V. II.
Fireproofing	.. .. ..	751
Fir, Scotch	.. .. ..	685
Fir Wool, Oil, and Extract	..	687
Fischer's Modifd. Ringer Soln.		742
Flagella Stains	.. ..	Vol. II.
Flaginac	.. ..	Vol. II.
Flame Tree	.. .. ..	836
Flavoring Agents	.. ..	445
Flavine	.. ..	312
Flax Seed	.. .. ..	840
Fleabane	.. .. ..	828
Fleming's Liq. Chrom. Acet.-Osmic	.. .. ..	805
Fleming's Neutral Red Medium		907
,, Syph. Test	..	Vol. II.
,, Tinct. Aconite. 1 to 5 m.		109
Fletcher's Artif. Dentine	..	802
Flexner's Serum	.. ..	889
Flies to ward off, *vide* Therap. Index, Bites and Stings.		
Flour Faking Standardisation, etc.	.. ..	Vol. II.
Fluid Magnesia, 1–2 ozs.	..	538
Fluidextr. Aconiti, av. ½ m.	..	108
,, Apocyni, 15 m.	..	182
,, Bellad., Rad., ½ to 1 m.		237
,, Buchu, 30 m.	..	260
,, Calami, 15 m.	..	
,, Cannab. Ind., 1½ m.		281
,, Capsici, 1 m.	:	287
,, Cascara	.. ..	289
,, ,, Aromat,. 30 m.		289
,, Chiratæ, 15 m.	..	823
,, Cimicif,. 15 m.	..	823
,, Cinchonæ, 15 m.	..	310
,, Cocæ, 30 m.	..	338
,, Colchici Sem., 3 m.		363
,, Conii, 3 m. U.S. 0.45% Conine	..	
,, Convallar., 8 m.	..	824
,, Cypripedii (1=1) 15 m.	.. ..	408
,, Digitalis. 1 m.	..	408
,, Ergotæ, 30 m.	..	419
,, Eriodictyi, 10–40 m.		867
,, Euonymi, 10 m.	..	423
,, Eupatorii, 30 m.	..	829
,, Frangulæ, 1–4 dr.		830
,, Gentianæ, 15 m.	..	831
,, Geranii, 15 m.	..	831
,, Granati, 30 m.	..	659
,, Guaranæ, 30 m.	..	833
,, Hamamelid. Fol., 30 m.		455
,, Hyoscy., 3 m.	..	492
,, Ipecac., Emetic, 15 m. Expt., 1 m.		515
,, Krameriæ, 15 m.	..	838
,, Lappæ, 30 m.	..	839
,, Leptandræ, 15 m.		839
,, Lobeliæ, 8 m.	..	840
Fluidextr. Nucis Vom., 1 m.	..	599
,, Phyto-lacc. Emetic. 15m. Alterat., 1½ m.		849
,, Mezerei	.. ..	843
,, Pilocarpi, 30 m.	..	532
,, Podophylli, 8 m.	..	693
,, Pruni Virginianæ (Glycero-hydro-alcoholic), 30 m.		
,, Quassiæ	.. ..	852
,, Quillaiæ, 3 m.	..	853
,, Rhei, 15 m.	..	853
,, Rosæ, 30 m.	..	854
,, Rubi, ½ to 1 dr.	..	854
,, Sanguinariæ, 1½ m.		855
,, Sarsaparillæ, 30 m.	..	856
,, Scillæ, 1 in 1, 1½ m.		857
,, Scutellariæ, 5 to 15 m.		857
,, Senegæ, 15 m.	..	858
,, Sennæ 30 m.	..	858
,, Spigeliæ, 1 dr.	..	860
,, Staphisagriæ, 1 m.		861
,, Stillingiæ, 30 m.	..	861
,, Stramonii, 1 m. (0·25 per cent. alk.)	..	
,, Sumbul, 30 m.	..	862
,, Tritici, 1 to 2 dr.	..	808
,, Uvæ Ursi, 30 m.	..	813
,, Valerianæ, 30 m.	..	797
,, Veratri, 1½ m.	..	865
,, Viburni Prunif., 1 to 2 dr.	.. ..	866
,, Xanthoxyli, 30 m.	.	867
,, Yerba Santa, 15 m.		867
,, Zingib. 15 m.	..	868
Fluid-glycerates	.. ..	445
Flumerin	.. .. ..	674
Fluorescein	.. .. ..	673
,, Mercury Comps.		674,675
Fluorine	.. ..	V. II.
Fluoroform	.. .. ..	805
Fly Deterrents & Destruction		1011
,, Papers, Arsenic	..	Vol. II.
,, ,, Sticky	.. ..	866
Fly, Spanish or Blistering	..	281
Fœniculi Fructus, 829; Fœnugreek	.. .. ..	829
Fontana's Stains	..	Vol. II.
Food and Drugs Act	..	Vol. II.
Food Colours	.. ..	Vol. II.
Food Preservatives	..	Vol. II.
Foods, 575 *et seq*; Calorie Values of various, V. II.; Diabetic 588; Infants', A. B. C.	.. .. ..	581
Food Factors, Accessory	..	589
Food Poisoning	.. ..	1013
,, ,, Metal contamination *see* also Ptomaines		1014
Fool's Parsley	.. .. ..	807
Formagules (Benzol, 322; Iodoform, 498; Olive Oil, 618; Santalol, 622)	.. ..	684
,, Emetine Ol. ¼ gr., 526; Naphthalene, Tetrachlor		566

NAME.	DOSE.	PAGE
Formagules; Paremelol	¼ gr.	526
Formaldehyde134; Glycerin, 136; Formaldehyde Tablets, Internal	.. .. ..	140
Formaldehydum Polymerisatum = Paraform	.. .. ..	139
Formalin, Formol, 134; Chlorof. Sols., 137; Disinfecting Tablets, 139; Gargle 136; Inhalation, 137; as Meat, etc., Preservative	..	Vol. II.
Room Fumigation	.. ..	135
Formalised Gelatin	.. ..	436
,, ,, Capsules	..	684
Formamin, 456; Ethyl Iodide		500
Formamint Tablets	.. ..	140
Formanilid, 2 to 4 gr.	. ..	137
Formic Preservative	.. ..	39
Formidin Gze. and Tape		500, 501
Formin. 5 to 15 gr.	.. ..	456
Formitrol Pastilles	.. ..	140
Formol	.. .. ..	134
Formolyptol	.. .. ..	140
Formosyl 137; Dental Dressings, 138; Mouth Wash, 138; Tooth Paste, &c., 138; Gargle, 138; Glyc. Soap 737; Pastils 138; Pessaries, 138; Toilet Soap	.. .. ..	138
Formosyls, Perfumed	..	600
Formyl Terchloride, 1–5 m.	..	297
Fosfoxyl	.. .. ..	680
Fotus Acid Borici, 6 dr. to 1 pint		
,, Belladonnæ, 1 to 2 dr. of Tinct. to 1 pint	..	
,, Opii, ½ to 2 dr., to 1 pint		
,, Papaveris, 2 ozs. to 1½ pints 15 minutes; foment at 120° F.	..	
Four Gland 'Tablets'	.. ..	969
Fourneau '309'	.. ..	224
Fournier's Syringe	.. ..	461
Fowler's Solution, 2 to 8.	..	192
Fragaria	.. .. ..	830
Fraisse's Ferrug and Serum Ampoules	.. .. ..	47
Frambœsia, V. II.; Frangula	.	830
Frankincense	.. .. ..	685
Fraser's Root	.. .. ..	817
Fraxinus ornus	. .. ..	841
Freeman's Chlorodyne	..	Vol. II.
Freezing Mixtures	..	Vol. II.
French Chalk	.. .. ..	156
Friar's Balsam, ½ to 1 dr.	..	8
Fredericia's CO_2 tensimeter		..V. II.
Friedländer's Pneumo. bacillus		V. II.
Fröhde's Reagent	..	Vol. II.
Frost Bite	.. .. ..	1032
Fructolax, 2 to 3 dr.	.. ..	655
Fructose	.. ..	733
Fuchsine (Carbol Solution)		..V. II.
,, ½ to 4 gr., 323, Acid or 'S'	..	..V. II.
,, Ointment	.. ..	328
,, Aniline Green		Vol. II.
Fuchsine Sulphurous Acid Test		V. II.
Fucus Vesiculosus	.. ..	830
Fullers' Earth	.. .. ..	155
Fuller's Inhalant	.. ..	397
Fumigators	.. .. ..	135
Fumus Potassii Nitratis	..	701
Fungi, poisoning by (see Poisons and Antidotes).		
Fungus igniarius, P. Austr.	..	810
,, Laricis	.. .. ..	807
Fur Dyes	.. .. ..	321
Fusel Oil	. .. .	128
Galactose	.. ..	Vol. II.
Galangal, 830; Galbanum, 5 to 15 gr.	.. .. ..	830
Galega, 830; Gale, Sweet	..	816
Galium Aparine, 831; *Galla*, 7½ gr. av.	.. .. ..	831
Galvanometer	.. ..	Vol. II.
Galyl 4 to 6 grains	.. ..	222
Gamlbir, 820; Gamboge ½ to 2 gr.		817
Gamgee (Gauze and Wool) Tissue	.. .. ..	448
Ganja	.. ..	280
Garcinia Hanburii	.. ..	817
Gardner's Syr., 1 to 3 dr.	..	512
Garfield's Tea	.. ..	702
Gargar Acidi Benzoici	..	8
,, Acid Carbolic	.. ..	19
,, Acidi Tannici	.. ..	106
,, Aeruginis	.. ..	401
,, Aluminis (et Co.)	..	441
,, Carbolica	.. ..	19
,, Chlori	.. .. ..	748
,, Formaldehydi	..	136
,, Formosyl	.. ..	138
,, Hyd. Co.	.. ..	480
,, ,, Perchlor.	. ..	474
,, Hydrog. Perox.	..	486
,, Potass. Chlor.	..	697
,, ,, Permang.	..	547
,, Resorcini	.. ..	731
Garlic, ½ to 2 dr.	.. ..	808
Garrod's Lozenges	.. ..	771
Gas, Dental	.. .. ..	158
,, Mantles	.. .. ..	780
,, Oxygen and Ether.	..	114
,, Poisoning	.. .. ..	1064
Vide also Respirator Soln.	p. 105	
Gasoline	.. .. 657 &	V. II.
Gastric Contents Examn.		Vol. II.
,, Ulcer, 927, and Therap. Ind.		
Gaubius' Table of Dosage	..	1068
Gauducheau's Stain	..	Vol. II.
Gauze-covered Moss	.. ..	760
Gauze, Bismuth Subgallas	..	249
,, Bromphenobis	..	24
,, Carbolised	.. ..	19
,, Cyanide	.. .. ..	467
,, Iodoform	..	448, 498
,, Picric	.. ..	75, 448
Gauzes and Gauze Tissues	..	448
Gazoline	.. .. ..	658
Gee's Cough Linctus, 1 dr.	..	630

NAME.	DOSE.	PAGE
Gelanthum	.. .. ..	786
Gelatin Glycerin	.. ..	441
,, Injections	.. ..	2, 435
,, Nutrient (Bact.)	..	V. II.
,, Pastils	.. .. ..	442
Gelatina Sol. Steril.	.. ..	435
Gelatinum	.. .. ..	435
,, Calcii Chloridi, 5to 7 Cc.		272
,, Formalisat	.. ..	436
,, Glycerinatum	.. ..	441
,, Sterules	.. .. ..	435
,, Zinci, and with Ichthyol, Picis 5%, Resorcin 3%		801
Gelignite	.. .. ..	569
Gelineau's Dragées, 1 *p.d.* increased to 3	.. ..	169
'Gels'	.. ..	369
Gelsemii Radix, 5 to 15 gr.	..	437
Gelsemin (Eclectic), ½–2 gr.	..	437
Gelseminina, 1/100 to 1/32 gr.		437
Gelseminine HCl., 1/60 to 1/20 gr.		437
Genasprin, 5 to 15 gr.	..	86
Genatosan	.. .. ..	45
Gencydo	.. ..	831
Gentianæ Radix	.. .. ..	831
Gentian Violet, 328; Aniline	..	V. II.
Geraniol	.. ..	Vol. II.
Geranium Mac., 1 to 5 gr., 831; Cape	.. ..	843
German Measles	.. ..	976
Germander	.. .. ..	863
Germanium	.. .. ..	831
Germicides, Chapter on	..	V. II.
Gerrard's Test Solution		Vol. II.
,, Peptonoids	.. ..	662
Ghâti or Ghatti Gum	.. ..	2
Giemsa's Infection, 712, Stain		V. II.
Gibson's Dysentery Vaccine	..	941
Gingelli Oil	.. .. ..	625
Ginger	.. ..	868
Gingerin, ¼ to 1 gr.	.. ..	868
Gingerol	.. ..	868
Ginseng	.. ..	831
Gipsey Nut	.. .. ..	864
Glands Ductless, see also Gland in question and	.. ..	944
Glandulæ Supraren Sicc., 4 gr.		959
,, Thyroideæ Sicc., 4 gr.	..	969
Glandulen	.. .. ..	948
Glaser's Salt, 30 to 120 gr.	..	702
Glass for Technical Work	..	752
Glass Soluble, or Water	..	752
Glauber's Salt	.. .. ..	753
Glaucium Luteum	.. ..	831
Glaxo	.. ..	587
Glew's Scintilloscope	.	Vol II.
Globin and Globulins	..	Vol. II.
Glonoin, Sol., ½ to 2 m.	..	568
Gloriosa Superba	.. ..	831
Glossaries	.. ..	Vol. II.
Gloves, Operation	.. ..	285
Glossinia Palp., Morsitans		Vol. II.
Gloves, Rubber 285; Subst.	..	365
Glucantha	.. ..	682, 786
Glucarsenol	.. .. ..	219
Glucosides	.. .. ..	831
Glucosum, 438 & V. II.; Glucose. Media	.. ..	V. II.
,, Estn. in Blood	..	646 & V. II.
,, Surgical Dressing	..	440
,, *Syrup*	.. .. ..	682
,, Tests for, in Urine		Vol. II.
,, Sterules (for feeding)	..	438
Glucusimide Glusidum ½ to 2 gr.		732
Gluten	.. .. ..	587, 588
Glutoid Caps, Iodoform, &c.		498 684
Glycaphorm, 1 to 2 dr.	.. ..	559
Glycerin, 1 to 2 dr.	..	440 & V. II.
,, *Acidi Borici*	..	12
,, ,, *Carbol*, 1 in 5	..	19
,, ,, Emergency form		443
,, ,, Hydriodici, 20–60 m.	..	512
,, ,, *Tannici*	..	441
,, Agar, V. II.; Aloes	..	150
,, *Aluminis* (c. Acid Tannic, 441)	..	151, 441
,, *Amyli*, 1 to 8	..	
,, Atropinæ	.. ..	229
,, Belladonnæ	.. ..	237
,, Bismuth Eff.	.. ..	244
,, Bismuthi Nitratis	..	244
,, Bismuth. et Sod. Tart., 1 dr.	.. ..	661
,, *Boracis*, 1 to 6	..	441
,, Broth	. ..	Vol. II.
,, c. Aq. Rosæ	. ..	441
,, Di-acetyl-morphinæ, 1 to 2 dr.	.. ..	559
,, Di-iodo-hydrin	..	512
,, Eastoni, 15 m.	..	432
,, Ext. Bone Marrow, 1–2	.. .. ..	944
,, Ferri Dialysat., 60 m.		427
,, ,, Perchlor.	..	426
,, Glyceroph. Co., 1 to 2 dr.	.. .. ..	46
,, ,, c. Medulla Rub, 1 to 2 dr.	..	46
,, Hyd. Perchlor	. 441,	474
,, ,, Alc (*caution* not for administration)	..	474
,, Hypophosp., 1 dr.	..	679
,, Iodoformi	.. ..	498
,, Iodi (and Morton's)		503, 507
,, Jelly, 441; Micro	..	V. II.
,, Pancreatis, 1 to 2 dr.		640
,, Papain, 1 dr. *c.c.*	..	650
,, *Pepsini*, 1 to 2 dr.	..	660
,, Pessaries	.. ..	442
,, Phosphori=Elix, 15 to 60 m.	.. ..	676
,, *Plumbi Subac.*	. ..	692
,, Resorcin	.. ..	730
,, Rose Water	.. ..	441
,, Soap Liq.	.. ..	737
,, Sodii Cinnam., 30 to 60 m.	.. ..	29
,, Spirit	.. ..	126
,, Substitutes	.. ..	443

NAME.	DOSE.	PAGE
Glycerin, Suppositories	..	442
,, Tampons	.. ..	442
,, Tinctures, *vide* Glycetracta	.. ..	786
Glyceritum Boroglycerini	..	12
,, Fe., Quin. Strych.,	15m.	432
,, Phenolis	.. ..	19
Glycero-alcohol, 5–60 m.	..	441
,, Piperaz., 5 to 10 gr.	..	681
Glycerole Easton. 15 m.	..	432
Glycerophosphates *et seq.*	..	41
Glyceryl Antimonite	.. ..	170
,, Trinit., $\frac{1}{200}$ to $\frac{1}{50}$ gr.	..	568
GLYCETRACTA :—	443 *et seq.*	
,, Aconiti, 0.4% alk., Av.1m.		
,, Bellad., 0.375% alk., 1 to 2m.		
,, Calumbæ, 10–20 m.		
,, Cascara, ½ to 1 dr.		
,, Catechu, 5 to 15 m.		
,, Chirettæ, ½ to 1 dr.		
,, Cinchonæ, 3% alk., 8 to 25 m.		
,, Cocæ. 0.25% alk., 1 to 2 dr.		
,, Colchici, 0.5% alk., Av. 3 m.		
,, Conii, 0.45% alk., Av. 3 m.		
,, Digitalis, ½ to 2 m.		
,, Ergotæ, 10 to 30 m.		
,, Gelsemii, 5 to 15 m.		
,, Gentianæ. 15–30 m.		
,, Hamamelid, 5 to 15 m.		
,, Hydrastis, 5–15 m.		
,, Hyoscy, Av., 3 m., 0.075% alk.		
,, Ipecac., 1.1% Expt. 1 to 4 m. Emetic, 30 to 40 m.		
,, Jaborandi, 5–15 m.		
,, Krameriæ, 5–15 m.		
,, Nucis Vomicæ, 0.75% Strych. 2–6 m.		
,, Pruni Virg., 5–30 m.		
,, Quassiæ, 2 to 5 m.		
,, Rhei, 5 to 30 m.		
,, Sarsæ, 2 to 4 dr.		
,, Scillæ, 1 to 5 m.		
,, Senegæ, 5 to 20 m.		
,, Sennæ, ½ to 1 dr.		
,, Tarax, ½ to 2 dr.		
,, Valerian, 5 to 20 m.		
See also Fluid Glycerates.		
'Glycin,' 7; Glycine, 6, 860; Glycocoll, 10 to 30 gr.,	..	6
Glyco-gelatin and Pastils		441, 442
Glycogen, 1½ to 2 gr. 733, 832 &		V. II
Glycoheroin, 15 m. to 1 dr.	..	559
Glycolactophos	.. ..	45
Glycopasta Aconiti Bellad., Hyoscy	.. .. ..	445.
Glycoproteins	..	Vol. II
Glycothymoline	.. ..	785
Glycyrrhiza, 5 to 20 gr.	.. ..	832
Glycyrrhizin, Amm., ½ to 5 gr.		832
Glykaline	.. ..	Vol. II.
Glykeron, 15 m. to 1 dr.	..	559

NAME.	DOSE.	PAGE
GLYL :—	.. .. ..	445
Amygd. Ess. sine HCN, Anethi.; Anisi; Aurant Amer; Aurant. Flor.; Carui; Caryophylli; Cinnam.; Fœniculi; Lavandulæ; Limonis.; Menthæ Pip.; Menthæ Vir; Myrist; Pimentæ; Pini; Rosæ; Sassafras; Thymi; Vanillæ	.. .. ..	445
Glymol = Paraff. Liq. *q.v.*		
Goa Powder	.. .. ..	308
Goat Serum in Cancer, see Cancer—Therap. Ind.	.. ..	
Goats and Leprosy	..	Vol. II.
Goat's Beard	.. ..	864
Goat's Milk	.. .. ..	585
Goat's Rue	.. .. ..	830
Goitre, 699, 749, 783, 895, 1030 and 1033; and Therap. Ind.		
Gokhru	.. ..	832
Gold and Sodium Chloride	..	234
,, Beater's Skin	.. ..	944
,, Colloidal	..	371, 379
,, Cure	.. .. ..	233
,, Cyanide	.. .. ..	698
,, Organosol	.. ..	388
Golden Seal, 10 to 30 gr.	..	483
Gomenol and Pâte	.. ..	842
Gomme Arabique 1, Sénégal 1, Goutte	.. .. ..	817
Gonal	.. ..	623
Gonoccocus, Vaccine	.. ..	895
,, ,, Detoxicated	..	896
,, ,, Culture Media	..	V. II
Gonorrhœa 895; Therap Ind.		1034
Goober Nut	.. .. ..	812
Goose Grass, 831; Goose Grease		562
Gorit (Calc. Perox.), 3–9 gr.	..	278
Gossyp. Rad. Cort.	.. ..	452
Gossypium	.. .. ..	447
Gossyp. Arseniosium	.. ..	194
,, Camph.	.. ..	279
,, Capsici	.. ..	288
,, Carbolisat	.. ..	1
,, Ferri Perchlor	..	420
,, Hyd. Iodidi	.. ..	468
,, Hyd. Perchlor	..	470
,, Iodi, 6%	.. ..	
,, Menthol	.. ..	55
,, Ol. Terebinth	..	68
,, Sal Alembroth	..	47
,, Stypticum	.. ..	42
Goulard's Extract	.. ..	69
Gout, 688; Powders, 850; See also Therap. Ind.	.. ..	
Gouttes Ameres de Baumé 4 m.	.. ..	600
Graham on Colloids	.. ..	36
Grains de Lin	.. .. ..	84
Gram's Method and Table		Vol. II
Granati Cortex	.. .. ..	65
Grant's D., Inhalation, 395; Insufflator Drops	.. ..	30
Granula Dioscoridis, 1 to 5	..	19

NAME. DOSE.	PAGE
Granules Aconitine and nitras, $\frac{1}{10}$ mgr.	110
Granules Atropine Sulph., 1 mgr.	227
,, Digitaline Crist., Fr.Cx. and Amorphe	410, 411
,, Digitaline Nat. ..	411
,, Digitoxin, $\frac{1}{250}$ gr. ..	412
,, Hyoscyamine, 1 hrly..	493
,, Strophanthin, $\frac{1}{10}$ mgr.	764
Grape Sugar	438
Gray's Stovaine Dextrin Inj. ..	357
Green, Brilliant	329
,, Malachite	329
Green Mountain Cure ..	701
Gregory's Pill = Pil. Coloc Co.,	
Gregory's Powder, 10 to 60 gr.	853
Grey Oil, 2 to 3 gr.	460
,, Powder, 1 to 5 gr. ..	459
Griffith's Mixture, $\frac{1}{2}$–1 oz = Mist. Ferri Co.	
Grignard Reaction	542
Grindeline, 1 to 2 dr.	453
Grindelia	452
Griserin	328
Grossich's Solution	509
Ground Nut Oil	812
Groundsel	858
Guaiaci Resina (& Liq.) 5–15 gr.	453
Tests for Blood ..	Vol. II.
Guaiacol (Cryst. 396) 1 to 5 m.	396 & V. II.
,, Benz., 4 to 12 gr. ..	398
,, Cacodyl., $\frac{1}{2}$–2 gr. ..	198
,, Camph., 5–10 gr. ..	398
,, *Carb.*, 5 to 15 gr. ..	398
,, Cinnam., 5–15 gr. ..	398
,, Iodide, 5 to 15 gr. ..	398
Guaiacol Sulphonate (Pot.) ..	399
Guaiacyl.	399
Guaicamphol.	398
Guanidine, Guanin ..	Vol. II.
Guarana, 10 to 60 gr. . ..	832
Guaranine, 1 to 5 gr. ..	262, 833
Guarea	824
Guaycuru, 832; Guaza ..	280
Guimauve Pastils	442
Guinea Worm	Vol. II.
Guipsine..	867
Gum Acacia, 1; *Ghatti* . ..	2
,, Acac. Intravenous ..	1
,, Glucose	2
,, Plant	452
,, Red	828
,, Thus	685
Gummi Indicum	2
Gun-Cotton	364
Günzberg's Capsule and Test	Vol. II.
Gurjun Balsam, $\frac{1}{2}$ to 2 dr. ..	814
Gut, Chromic, Iodised, etc. ..	535
Guttæ Ac. Carbol., 19; Ac. Salicyl. Co., 81; Adrenalin, 960; Alum. Acet., 152; Atropinæ Sulph., $\frac{1}{4}$, $\frac{1}{2}$, 1 and 2%, 228; Atropinæ c. Cocaina, 228; Atropinæ c. Zinco, 228 Atropinæ et Quininæ, 229; Castor Co. 1 dr., 820; Chlorof. cum Menthol Co., 304; Cinnamon Co., 395; Cocainæ Hydrochloridi (& c. Adren.), 344; Cocainæ Oleosæ, 341 (and Factory Act) Cupri Sulphatis, 402; Daturinæ, $\frac{1}{4}$%, 493; Dionin, 558; Eucainæ, 350; Hectine, 221; Homatropinæ, 1%, (et c. Cocaina), 231; Hydrargyri Nitratis (Aural), 472; Hydrogen Perox., 486; Hyoscinæ, 0.5% (et c. Cocaina), 490; Hyoscyaminæ, 493; Iodi Farrer, 1052; Morphinæ et Cocainæ (Aural), 555; Physostignimæ, 0.06 to 1% (et. c. Cocaina), 681; Physostigminæ et Quininæ, 681; Pilocarpinæ, 0·5%, 533; Quininæ Formatis, 2%, 711; Rosæ, 2 to 10 m., 555; Sodii Arsenitis et Ferri, 5 m., 196; Zinci Chloridi (et c. Cocaina), 799; Zinc Chlorid (Aural), 799; Zinc Chlorid. c. Adrenalin, 799; Zinc. Sulphat. 803.	
Gutta-Percha and Tissue ..	285
Guy's Tonic	Vol. II.
Gynocardia Odorata.	606
Gypsum (Calcii Sulphas) ..	274
Gyrol Pencil	287
Haarlem Drops	688
Hæmaboloids et c. Arsen. et Strych., $\frac{1}{2}$ oz.	428
Hæmacytometers ..	Vol. II.
Hæmalum and Acid ..	Vol. II.
Hæmagglutinin Reaction	Vol. II.
Hæmatein (Hæmatin V. II.) .	833
Hæmatocrite	Vol. II.
Hæmatoporphyrin 768 &	Vol. II.
Hæmatoxylin, .. 833 and	Vol. II.
Hæmatoxyli Lignum	833
Hæmoglobin and Caps, 1 to 2 dr.	577 & V. II.
Hæmoglobinometers ..	Vol. II.
Hæmolysin	869
Hæmomanometers ..	Vol. II.
Hæmoplastin	928
Hæmoptysis (*v.* also Therap-Index)	167
Hœmorrhagic Infective Jaundice	Vol. II..
Hæmorrhoids, 455, and Therap. Ind.	
Hæmostatic Serum	928
Haffkine's Prophylactic 890&	Vol. II.
Hafnium	Vol. II.

NAME.	DOSE.	PAGE
Hair Dyes, Henna, 833; Hydrog. Perox., 485; "One Solution," Vol. II.; Pot. Permang. 546; Mrs. Potter's Walnut Juice, 321; Pyrogallol Vol. II.; Paraphenylene		320
Hair Lotion, Amyl Nit. and Pilocarpine	.. ..	169
,, ,, E. Wilson's	..	160
Hair's (Dr.), Cure for Asthma.		V. II.
Halazone Tablets	.. ..	64
Halliburton's Test	..	Vol. II.
Haldane Oxygen App...	..	636
Hallam Moss	.. .. ..	760
Hall Edwards CO_2 App.	..	26
Hall's Wine	.. ..	Vol. II.
Hamamelidin, ½ to 2 gr.	..	455
Hamamelidis Cort. et Fol.	..	454
Hamilton's Pill	.. ..	390
Handkerchiefs, Aseptic	..	448
Harmalin	.. .. ..	328
Harmal, Harmaline, Harmine..		833
Harrington's Soln.	.. ..	476
Hartley's Test	.. ..	Vol. II.
Hartshorn and Oil	.. ..	159
Harvard Liquid, 841; Harvey's Pills, V. II.; Hashish 280 &		V. II.
Haust. Cascaræ Sag., 1 oz.	..	290
,, Chloralamidi, 1 oz.	..	297
,, Copaibæ, 1 oz.	..	624
,, Creosoti, ½ to 1 oz.	..	393
,, Filicis, 1 oz.	.. ..	435
,, Imperialis	.. ..	703
,, Nitroglycerini, 1 oz.		570, 571
,, Santonini et Ol. Ricini, 1½ oz.		735
Sulphonal, 1 oz.	..	769
,, Tereberni ,,	.. ..	777
,, Trional, 1 oz.	.. ..	769
,, Ureæ Co. 3½ ozs.	..	789
Hayem's Blood Fluid,..		Vol. II.
,, Solution (Serum)	..	744
Hay Fever, 896; Nebulæ	..	568
,, Vaccines	.. ..	897
,, Hypersensitiveness Reaction Outfit..		897
(*See* also Protein Therapy and Therapeutic Index).		
Hazel Foam and Comps.	..	454
Hazeline, ¼ to 3 dr.	.. ..	454
Head and Headache Powders		Vol. II.
Heal-All	.. .. ..	824
Health Resorts..	..	Vol. II.
Heart, Auricular Fibrillation		705
Heart Extract, Syph. Test		Vol. II.
Heather ..	.. ..	Vol. II.
Heberden's Ink, = Mist. Ferri Arom., '85, 1 to 2 oz.		
Hectargyre	.. .. ..	221
Hectine, 0·1 to 0·2 Gm..	..	221
Hedera, 833; Hederin	..	833
Hehner's Test	.. ..	Vol. II.
Heiser's (Chaulmoogra) Injn. ½ to 10 Cc.	.. .. ..	607
Helalin, 824; Helba	..	829

NAME.	DOSE.	PAGE
Helenin, ¼ to 2 gr.	.. ..	836
Helianthin	.. ..	Vol. II.
Helicon, 5–15 gr.	.. ..	86
Heliotropin	.. .. ..	833
Helium ..	.. ..	Vol. II.
Hellebore, Black, Green, 1–5 gr., White .	.. ..	865
Helmerich's Pomade	.. ..	772
Helonias dioica .	.. ..	833
Hematic Hypophosphites	..	679
Hemidesmi Radix	.. ..	833
Hemisine	.. .. ..	960
Hemlock (Lesser, 807)	..	390
,, Spruce, 850; Water..		823
Hémostyl	.. .. ..	928
Hemp, Canadian, 182; Russian		817
Henbane, 492; Seed Oil, 619; Egyptian	.. .. ..	492
Henna	.. ..	833
Hepatic Abscess	.. ..	519
Heracleum	.. .. ..	833
Herbe aux Chantres	.. ..	828
Herogen, 2 dr. .	.. ..	578
Heroin HCl., $\frac{1}{25}$ to ⅛ gr.	..	559
Hetol, 3 to 5 gr.	.. ..	29
Heusner's Glue .	.. ..	842
Hevea Brasiliensis	.. ..	284
Hexachlorethane	.. ..	121
Hexavaccine	.. .. ..	931
Hexamina = Hexamethylen-tetramine, 5 to 15 gr.	..	456
,, Experiments with	..	V. II.
,, Benzoate, 5 to 15 gr.	..	458
,, Borate, 15 to 60 gr.	..	457
,, Camphorat., 8 to 12 gr.	.	459
,, Ethyl-Bromide	.. ..	258
,, Glycochol	.. ..	459
,, Salicylate, 5 to 15 gr.	..	458
,, Sod. Acet., 30 gr.	..	459
,, Sodium Benzoate	..	458
Hexanitrin, 1 gr.	.. ..	421
Hey's Green Paste	.. ..	330
Hiera Picra, 3 to 10 gr.	..	150
High Explosives	.. ..	320
Hill's (Leonard) Oxygen Bag	..	636
Hill's (William) Œsoph. Catheter		V. II.
Himalayan Oils	.. ..	834
Himrod's Cure	.. ..	701
Hindu Dates	.. .. ..	863
Hippocastanum	.. ..	806
'Hippocras', 868; Hippurates		11
Hirudo –	.. .. ..	947
Hirudin ..	.. .. ..	947
Histamine, 418, 664, 667, 670, 951		& Vol. II.
Histidine	.. ..	418 & V. II.
Hoffman's Anodyne, 60 to 90 m.		118
Holadin ..	.. .. ..	641
Holarrhena	.. .. ..	834
Holloway's Ointment & Pills		Vol. II.
Holocaine HCl.	.. ..	351
Homatropinæ HBr., 1/80–1/20 gr.		231
,, HCl., 231; Salicyl., 1/80 to 1/20 gr.	.. ..	231
Homatropine	.. ..	225, 230

NAME.	DOSE.	PAGE
Honey Water	.. .. ..	127
Honeysuckles	.. .. ..	840
Hookworm, see Ankylostom.		
Hop Smoking	.. .. ..	840
Hordenine, 834; Horehound,	30 gr.	841
Horlick's M. Milk tabs.		Vol. II.
Hormonal, 15 to 20 Cc., Children less	.. .. ..	957
Hormones (Pancreas 643)	..	950
Hormotone Tabs.	.. ..	970
Horse-chestnut, 806; Horse-hair	.. ..	536
Horsenettle	.. .. ..	859
Horseplasma	.. .. ..	927
Horseradish	.. .. ..	824
Horse Serum	.. ..	869, 927
Horsley's Wax	.. .. ..	821
Horticultural Poisons	..	190
Hort, on Life Cycle of Bacteria		932
Hound's Tongue	.. ..	826
Household Ammonia	.. ..	160
Hübl's Iodine Solution		Vol. II.
Huile Camphrée	.. ..	277
,, de Bouleau	.. ..	691
,, de Cade	.. .. ..	691
,, de Foie de Morue	..	615
,, Creosot. Iodof.	.. ..	498
,, d'Iodure Mercurique, 1 Cc.		468
,, de Jusquiaume Co.	..	492
,, d'œilette	.. ..	619
,, de Pétrole	.. ..	657
,, Grise Injectable, 2 to 3 gr.		460
,, Lourdes de Pétrole	..	653
Hulle's Soluble Strychnine	..	767
Humbergum	.. .. ..	625
Humagsolan	.. .. ..	683
Humulus Lupulus	.. ..	840
Hurtley's Test	..	Vol. II.
Huxham's Tincture, ½ to 1 dr.	..	310
Hyaline Cartilage	.. ..	577
Hycol	.. ..	37
Hydatid Fluid	..	Vol. II.
Hydnocarpus	.. .. ..	606
,, Eth. Esters.	..	612
Hydramyl, 658; Hydrangea	..	834
Hydrargyrum	.. 459 &	Vol. II.
,, Colloidal	372, 382,	387
,, Ionisation	..	Vol. II.
Hydrarg. Amalgam	.. ..	463
Hyd. Amido-Acetas, ⅛ gr.	..	7
,, *Ammoniat.*	.. ..	463
,, Benzoas, 1/50 to 1/10 gr.		464
,, *Bichloridum* = *Perchloridum*, 1/32 to 1/16 gr.	..	472
,, Bijodat (Biniodid)	..	467
,, *Biniodidum*, $\frac{1}{32}$ to $\frac{1}{16}$ gr.	467 &	V. II.
,, Bisulphid. or Bisulphuret, P.L. '51 = Vermilion.		482
,, Bromidum, 1/16 to ¼ gr.	..	464
,, Carbolas, ½ to 2 gr.	..	464
,, Chloratum mite	.. ..	478
,, *Chloridum* = *Subchloridum*, ½ to 5 gr.	..	478
Hyd. Chloridum Corrosivum	..	472
,, ,, Mite, U.S. = *Subchlor.*		478
,, c. *Creta*, 1 to 5 gr.	459 &	V. II.
,, Cyanidum, 1/20 to ¼ gr.	464 &	V. II.
,, Glycocoll, ⅛ gr.	.. ..	7
,, Imido-Succinas, ¼ to ⅓ gr.		480
,, Iodas, ⅛ to ⅓ gr.	..	65
,, Iodidum Flavum	..	470
,, ,, ,, (-ous), ⅛ gr.	..	470
,, *Iodidum Rub.*, 1/32 to 1/16 gr.	467 &	V. II.
,, ,, Viride, ⅛ to 1 gr.	..	470
,, Lactas, ⅛ gr. hyp., *per os*, 1/5 gr.	.. ..	471
,, Naphthol-Acetas, ½ to 1 gr.		482
,, Nitras	.. .. ..	471
,, Nitroso-Nitrate	..	Vol. II.
,, *Oleas*	.. .. ..	602
,, Oleatum, 5, 10, 20 & 25% et (c. Morphina)	..	602
,, Oxidum (-ous)	.. ..	480
,, ,, *Flavum*	.. ..	481
,, ,, *Rubrum*, ¼ to 1 gr.		482
,, Oxycyanidum	.. ..	465
,, Oxysulphas	.. ..	481
,, Peptonas, *per os*, ½ to 1½ gr., hyp. ⅛ gr.	..	472
,, *Perchloridum* (Wool, 476), 1/32 to 1/16 gr. 472 &		Vol. II.
,, with Serum	.. ..	477
,, Persulphas, 2 to 5 gr.	..	481
,, et Potass. Iod., 1/16 to ¼ gr.	.. .. ..	469
,, ,, Tablets, V. II.; see also Solubes Biniodide	..	470
,, Protoiodid, ⅛ to 1 gr.	..	470
, Rhodanidum	.. ..	483
,, Salicyl., ⅓ gr.	.. ..	477
,, Salicyl.-Arsonas	.. ..	201
,, Sozoiodol.	.. ..	501
,, Stearas	.. .. ..	603
,, *Subchloridum*, ½ to 5 gr.	..	478
,, ,, Duret's Form Cryst.		478
,, Succinas, ¼ to ⅓ gr.	..	480
,, Succinimid., ¼ to ⅓ gr.	..	480
,, Sulphas, Subsulph., 2 to 5 gr.		481
,, Sulphidum	.. ..	482
,, Sulphocyanidum	.. ..	483
,, Sulphuret c. Sulph.	..	482
,, Tannas, 1½ gr.	.. ..	481
,, Thymol Acetas, ½ to 1 gr.		482
,, et Zinci Cyanidum	..	466
Hydrarsan, ½ oz.	.. ..	195
Hydrastin 2 to 5 gr.	.. ..	484
Hydrastina (Alk.), ½ to 1 gr.	..	484
Hydrastinæ HCl., ½ to 1 gr.	..	484
Hydrastininæ HCl., ½ gr.	..	484
Hydrastis, 10 to 30 gr	483 &	Vol. II.
Hydrazobenzene	.. ..	323
Hydriodic Ether	.. ..	121
Hydrion Tablets (Mercuric Chloride)	.. .. ..	476
Hydrosols	.. .. ..	371
Hydrocotyle Asiatica, 4 to 10 gr.		834

NAME.	DOSE.	PAGE
Hydrocupreine		399
Hydrogen Borate		11
,, Ion Concentration of Blood		Vol. II.
,, Peroxide, ½–2 dr.		15, 485 & V.II.
,, ,, Borated		487
,, ,, Mouth Washes		486
,, Transmutation of		Vol. II.
Hydrogenit		Vol. II.
Hydrolete		Vol. II.
Hydrophobia		Vol. II.
Hydropyrin		92
Hydroquinine HCl.		400
Hydroquinone, ½ to 5 gr.		835
,, Developers		V. II.
Hydroxylamine, HCl. & Sulph.		834
Hydroxy-phenylethylamine		419, 964
Hydroxyphthalophenon, 2–5 gr		672
'Hydroxyl,' 485; Group, effect of		V. II.
Hyodin, 1 to 3 dr.		512
Hyoscina		488
Hyoscinæ HBr., 1/200 to 1/100 gr. or less		489
,, HCl. & HI., 1/200 to 1/100 gr. or less		491
Hyoscyami Folia		492
,, Mutic. Fol.		492
,, Semina, 2–10 gr.		492
Hyoscyamina, 1/200 to 1/100 incr.		493
Hyoscyaminæ HBr. et *Sulph.*, 1/200 to 1/100 gr.		493
Hyperglycæmia		642
Hyperol		Vol. II.
Hypertonic Saline		743
Hypnogen		790
Hypnone, 1½ to 5 m.		5
Hypo and Hyperthyroidism		972
Hypobromite Sol.		V. II.
Hypochlorite Antiseptics		51 *et seq.*
,, Dakin's		57 *et seq.*
Hypod. Injections, to sterilise		V. II.
,, Purgatives: Aloin, Apocodeine, 362; Colocynthin, 390; Hormonal		150, 957
,, Sterules, see Sterules.		
,, Tabs., *v.* Tablets. Hypodermic.		
Hypophosphites		677 *et seq.*
Hypophysis		949
Hypophysin		953
Hysterionica		826, 835
Hysterol		798
Ibogaine and HCl., ⅛–½ gr.		835
Iceland Moss		821
Ichthalbin, ¾ to 15 gr.		495
Ichthoform		496
Ichthosulphol		494
,, Proteinate		495
Ichthyocolla		835
Ichthyol, Amm., Lith. Sod. Zinc.		494 *et seq.*
Ichthyol Paste, 495; Resorcin, 495; Salicyl		495
Ignatia Amara Beans		600
Ihle's Paste		731
Ilex Paraguayensis		266
Illipei		815
Iminazolylethylamine		418
Immune Body		869 & Vol. II.
,, in Asthma		662
Immunisation		868 *et seq.*
Immunity Reaction		870
Imperial Drink		703
Incitamin		928
Incubation periods of infectious diseases		976
India Rubber		284 & Vol. II.
,, ,, Paste for Mulls		Vol. II.
Indian Hemp, Amer., 182; White, 814; *Indian Squill*		864
Indian Ink		Vol. II.
Indian Lemon Grass, 847; Licorice, 804; Pink Root, 860; Root		830
Indican		Vol. II.
Indicators for Vol. Analysis		Vol. II.
Indigo, V. II.; Carmine and comps.		Vol. II.
Indol Reaction		Vol. II.
Industrial Methyl. Spirit		129
Inebriety		124, 126, 127, 226, 310
Inecto		321
Infant Feeding		578 *et seq.*
,, in Tropics		584
,, Foods "A," "B," "C," and Cocoa		581, 582
,, Starch for		584
Infectious Diseases Table		976
Influenza 898, 1038; Vaccine, 898; Bacillus		899 & Vol. II.
,, Infective Period		976
,, Epidemology		901
,, Filtrable Virus of		901, 902
,, and pneumonia		900, 901, 903
,, 'Spanish,'		901
,, War Office Conf. Vaccine		899
,, In India		901
,, Detoxicated Vaccine		902
Infundibular Ext., ½ to 1 Cc.		953
Infundin		953
Infusa Concentrata		496
,, *Alstoniæ*, ½ to 1 oz.		810
,, *Anthemidis, 1 in 20, 1 to 4 oz.		812
,, **Aurantii*, 1 in 20, & * *Co.*, ½ to 1 oz.		
,, Bardanæ		839
,, **Buchu*, 1 to 2 oz.		260
,, **Calumbæ*, ½ to 1 oz.		817
,, **Caryophylli*, 1 in 40, ½ to 1 oz.		
,, **Cascarillæ*, ½ to 1 oz.		820
,, **Chiratæ*, ½ to 1 oz.		823
,, *Cinch. Acid*, ½ to 1 oz.		
,, Cocæ, 4 to 8 oz.		338
,, Condurango, ½ to 2 oz.		284

*Also Conc., *i.e.*, 8 times strength *v.* p. 496.

NAME. DOSE.	PAGE
Inf. *Cuspariæ, 1 in 20, 1 to 2 oz.	
,, *_Digitalis_, ¼ to ½ oz. ..	408
,, _Ergotæ_, 1 to 2 oz. ..	
,, _Gentianæ Co._, ½ to 1 oz. ..	831
,, ,, Conc.	232, 496
,, Gokhru, 10 oz. daily ..	832
,, Hemidesmi	833
,, Hydrastis	483
,, Kava-Kava, ½ pint ..	838
,, *_Krameriæ_, 1 in 20, ½ to 1oz.	
Lini, 1 in 30, Liquorice, 1 in 90, _ad lib._	
,, *Lupuli, 1 in 20, 1 to 2 oz.	
,, Marrubii	841
,, Menyanthis, 2–6 oz. ..	842
,, Polygalæ Co., ½–1 oz. ..	858
,, *_Quassiæ_, ½ to 1 oz. ..	852
,, *_Rhei_, 1 in 20, ½–1 oz. ..	
,, *_Rosæ Acidum_, ½–1 oz. ..	854
,, *_Scoparii_, 1 in 10, 1 to 2 oz.	
,, *_Senegæ_, ½ to 1 oz. ..	858
,, *_Sennæ_, ½ to 2 oz.	
,, ,, Conc.	497
,, *Serpentariæ, ½–1 oz. ..	859
,, Simarubæ, 1 oz.	859
,, Symphiti, 1 to 2 ozs. ..	862
,, ,, Conc., 2 to 4 dr. ..	862
,, Tabaci	845
,, _Uvæ Ursi_, ½ to 1 oz. ..	813
,, *Valerianæ, 1 in 40, ½ to 1 oz.	
,, Vincæ Majoris, 5 oz. ..	866
,, Violæ Tricolor	866
Ingluvin, 5 to 20 gr.	661
Inhalatio Iodi Co.	395
Inhalation Allyl Sulph. ..	809
Inhalations, Continual, 136, 395; Oro-nasal	395
Inhaler, Ammon, Chlor. ..	157
,, Nasal Ozonic, Ozonic, Poor Man's, Portable ..	550
,, Yeo's	395

INJECTIONS HYPODERMIC :—

Inj. Acid, Carbol., 5–20m. ..	20
,, ,, Chaulmoog. 'C' ..	612
,, ,, Lactici (laryngeal)..	66
,, ,, Salicyl.	78
,, Aluminis (Vaginal) ..	151
,, Alypin c. Suprarenin ..	352
,, Antimonii (metal) Intramusc., 180 Cinnamica, 15 to 30 m.	174
,, Antimonii Oxidi, 15 to 30 m.	170
,, ,, Ox. Fortior ..	173
,, ,, Pot. Tart. Castellani, ½ to 1 Cc. ..	175
,, Antimonii Sod. Tart. ..	178
,, Antipyrin, 8 to 30 m. ..	334
,, ,, et Cocainæ, 8 to 30 m.	334
,, Apocodeinæ, 30 m. ..	362
,, _Apomorph._, 5 to 10 m. ..	183
,, Argenti Nit. (urethral) ..	186
,, Arsen. Iodid., 6 m. ..	194
,, Arsen. et Ferri, 1 Cc. ..	196
,, Arsen, et Strych., 5 to 10 m.	196
,, Arsen. et Strych. et Quin., 5 to 10 m.	197
,, Atropinæ, 2 to 8 m. ..	228
,, Atrop. c. Strych.	226
,, Bismuthi Subnitratis ..	246
,, Cacodylate Co., av. 17 m.	200
,, Caffeinæ Hyp., 1 to 6 m ...	264
,, Camphoræ Hypod., 10 to 30 m.	277
See also Sterules Hyp.	
,, ,, Hyp. Aether, 10 m.	278
,, _Cocainæ Hyp._ (5%), 5 to 10 m., 344; Barts. ..	344
,, Cocainæ et Nitroglycerini up to 15 m	345
,, Cocaine et Sod. Bic. (urethral)	346
,, Codeinæ Hyp., 6 m. ..	362
,, Coninæ HBr., 1 to 3 m. ..	391
,, Curare Hyp., 1 to 6 m. ..	825
,, Curschmann's, 15 m. ..	278
,, Durant's	397
,, _Ergotæ Hyp._, 5 to 10 m. ..	417
,, Ergotoxinæ, 2 to 15 m. ..	418
,, Eucain, Lact. (urethral) ..	351
,, Fibrocoumarin, 25 m. ..	31
,, Guaiacol (Durant) ..	397
,, Guaiacol c. Iodoform ..	397
,, Homatropinæ, 1 to 6 m. ..	231
,, Hyd. Biniodidi (vaginal) ..	468
,, ,, Cyan., 2 to 10 m. ..	465
,, ,, Intramusc., 10 m.	460, 1056
,, ,, Oxycyanid.	465
,, ,, Surg. Adams, 5 m. ..	460
,, ,, Intrav.	461
,, ,, Iodid., Ragazzoni, 2 to 6 m.	468
,, ,, Iod Intrav. Spittel ..	468
,, ,, Lambkin, 10 m. ..	460
,, ,, Perchloridi (Uterine and Vaginal) ..	476
,, ,, Subchlor., 10 m.	460, 479
,, ,, Succinimidi, 10 m. ..	481
,, Hyoscinæ, 5 to 10 m. ..	490
,, Hyoscyaminæ, 1/200 gr. inc.	493
,, Iodi. Hyp. Fortiss, 3 to 5 m.	503
,, Iodi, C.L.T.E. (also Douche)	503
,, ,, Carbolisati (Uterine)	20
,, Iodoformi (bladder) ..	498
,, ,, Ætherea	499
,, ,, c. Guaiacol	397
,,, ,, c. Menthol	499
,, Iodolysin	741
,, Lecithin, 1 Cc.	535
,, Luminal-Sodium, 2 to 3 Cc.	795
,, Menthol	550
,, Morphinæ Acet., 1 to 2 m.	554
,, ,, et Atropinæ, 1 to 3 m.	554
,, _Morphinæ, Hyp._, 5–10 m.	558
,, ,, (Sulph.) for War ..	557
,, Nitroglycerin, 1 to 4 m. ..	570

*Also Conc., *i.e.*, 8 times strength *v.* p. 496.

NAME. DOSE.	PAGE
Inj. Novocain cum Suprarenin	354
,, Nuclein, 15 m.	294
,, Ol. Chaulmoogr.	607
,, Physostigmin., 1 to 4 m.	681
,, Picrotoxini, 3 to 6 m. ..	849
,, Pilocarpin Nit., 2 to 6 m.	533
,, Plumbi (vaginal)	692
,, Pot. Permang. (vaginal) ..	546
,, Quin. HBr. Ac., 3 to 12 m.	711
,, ,, HCl. Ac., 3 to 12 m.	712
,, ,, Intrav. 4 to 15 gr. ..	715
,, ,, HCl.-Sulph., 3 to 12 m.	728
,, Ragazzoni, 2 to 6 m. ..	468
,, Sal-Alembroth, 10 m. ..	477
,, Salvarsan c. Novocain ..	213
,, Sodi Arsenitis et Ferri No. 1 and No. 2, 1 Cc. ..	196
,, Sodii Arsen. et Strych., 5 to 10 m.	196
,, ,, c. Quin., 5 to 10 m. ..	197
,, Sodii Cacodyl., 15 m. .. (Hyp., Intrav.; & Rectal)	200
,, Sodii Chloridi .. 742 *et seq.*	
,, ,, Cinnamatis, 10% sol., 30 to 60 m. ..	29
,, ,, Coumaratis, 25 m. ..	31
,, ,, Morrhuat., ½ to 4 Cc.	617
,, ,, Nucleinat.	294
,, ,, Salicyl., 15 to 30 m.	85
,, *Strych. Hyp.*, 5 to 10 m. ..	766
,, ,, Sulph., 1 to 6 m. ..	767
,, Suprarenal, 1 to 5 m. ..	959
,, Thoisinamin et Phenazone, 8 to 15 m.	740
,, Thiosinamin c. Sod.Salicyl., 15 to 30 m.	740
,, Thorii Oxidi	781
,, Zinc Chlor. (vaginal) 800; Sulphatis (Vaginal) ..	803
,, Permang (urethral) ..	549
Insect Bites	1011
Insect Flowers, Dalmatian ..	852
Insecticides, Horticultural, etc.	846
,, Petroleum ..	657
See also Cresol Soap Soln., 37; 'N.C.I.,' 566; Therap. Index, Bites and Stings and Parasites Animal on Skin.	
Insufflatio Bismuth, et Morph.	248
,, Calcis Iodatis c. Bism.	65
,, Eucalypti	828
,, Iodoformi & Comps. ..	499
,, Menthol (& Comps.)..	550
,, Orthoformi c. Resorcin	353
,, Paraformi	140
Insufflator Drops	304
Insurance Scrips and D.D.A., 987, 992, 993, 994.	
Intemperance. *See* Inebriety and Therap. Index.	
Internol	655
Integar Caps.	830
INSULIN 20 Units	641
,, Manufre	641
Insulin Patent	641
,, Scott's Method ..	643
,, Picric Acid Meth.	643,644
,, Distribution	644
,, Aqueous. Extrct. ..	644
,, Chem. Exn.	644
,, Units	644
,, Injection Technique .	645
,, Suitability of case ..	645
,, Contraindication ..	645
,, Hypoglycæmia ..	645
,, Excessive Dose ..	645
,, Glucose *per os* or intrav. with	645, 646
,, in diab. coma ..	643, 645
,, Blood Sugar Estn.	646 & V. II.
,, Clinical Experience ..	646
,, Inunction of . ..	647
,, Zymase ferments in relation	647
,, from yeast, fish, etc.,	644, 647
,, Refs., general	647
,, Glucose Equivalent ..	649
,, from clams.	649
,, Cammidge on	648
Intravenous Dose Table	1069, 1070
Intestinal Pills, etc. ..	683, 776
Intramine, Intramuscular, 1 to 5 Cc.	772
,, Intravenous, 50 Cc. ..	772
,, Caps (Internal) ..	772
,, Uses	772, 773
Intra-spinal Anæsthesia	350, 356
Inula Helenium, 836 Inulin	733, 836
Invert Sugar, 733 & V. II.; Invertase	Vol. II.
Invigoroids	Vol. II.
Iod-eosin	Vol. II.
Iodargol	387
Iodatol	504
Iodeol, 1 Cc.	387
,, Caps. and Ovules ..	387
Iodex, and with Meth. Sal. ..	511
Iodicin	622
Iodine	501 & Vol. II.
,, Albumen Comps. ..	511
,, Colloid Sol.	380
,, Comps., Organic ..	511
,, Douche	503
,, Formalin Gut	536
,, and Goitre ..	699, 749
,, in Benzene	509
,, ,, Dichlorethylene ..	306
,, Iontophoresis of	Vol. II
,, Jelly	503
,, 'Nascent'	502
,, Numbers of Fats	Vol. II.
,, in Paraffin	510
,, Sterules (Skin) . ..	508
Iodinol, 30 to 45 gr.	503
,, c. Ext. Malti, 1 oz. ..	504
,, Tablets	504
Iodinosol	81
IodisedGut, 536; Phenol and dil. Injn.	20

NAME.	DOSE.	PAGE
Iodised Wool, 6%	.. ..	505
Iodival, 5 gr.	.. .. ..	511
Iodo-Acetone	.. .. ..	5
,, Cyanine	.. .. ..	327
,, Caffeine	.. .. ..	265
,, -Casein	.. .. ..	512
,, Eosin	.. ..	Vol. II.
,, Fluorescein	..	Vol. II.
,, -Glyc. Sol., 1 in 50	..	503
,, -iso-propyl-alcohol	..	512
,, protein, 10 to 15 gr.	..	511
,, ,, Tablets, 10 gr.	..	512
,, -Tannin Syrup, ½ to 2 dr.	..	505
,, -theobromine, 2 to 10 gr.	..	780
,, -valerianyl-urea	.. ..	511
Iodof. and Acetone, 500; and Eucal. Bougies	..	499
,, Benzoyl Chloride	..	499
,, Caps. (Formagules)	..	498
,, Dressings	..	498 *et seq.*
,, Formagules	.. ..	498
,, Gauze Bdges.	.. ..	498
,, Oil	.. .. ..	498
,, Paste, 499; Pencils	..	499
,, Varnish, 499; Vaseline		500
Iodoform (& Præcip.), 1 to 3 gr.		497 & V. II.
,, Aromat.	.. ..	497
Iodol, 1 to 3 gr.	.. ..	501
Iodolysin, Inj., Sol., Pigment.		741
Iodo-pyrrol	.. .. ..	501
Iodostarin Tabs., 3 gr., 1 to 3 *t.d.*	.. ..	513
Iodum	.. ..	.. 501 & V. II.
Iodum, Collodial	.. ..	380
,, Oleatum, 10%	.. ..	504
Iohydrin	.. .. ..	512
Ionic Medication	..	Vol. II.
Ionium	.. .. ..	Vol. II.
Ionone	.. ..	866
Ions, Hydrogen and Hydroxyl		Vol. II.
Ipecacuanha, ½ to 2 gr. exp., 13 to 30 gr. emetic	..	513 & V. II.
,, *s.* Emetina, 5 to 20 gr.	..	514
Ipomœa batatus, 836; Congesta, 836; *Orizabensis*,		V. II.
Purpura, 836; Purga	..	836
Iridin, *syn.* Irisin, 1 to 3 gr.	..	836
Iridium (Collodial)	.. ..	372
Iris Florentina, Versicolor	..	836
Irish Moss	.. .. ..	823
,, Poisons Schedule	..	982
Iron Alum, 3 to 10 gr.	.. ..	433
Iron and Arsenic Drops, 5 drops (And Inj.)	.. ..	196
,, Comps., Organic	.. ..	428
Irritant Gases	.. .. ..	1064
Isinglass and Preps.	.. ..	835
,, Japanese	.. ..	807
Islands of Langerhans	.. ..	642
Iso-amyl-amine	.. .. ..	964
Iso-Emetine	.. .. ..	531
Isotonic Boric Acid Lotion	..	12
Isotonic Cocaine Lotion	..	344
,, Quinine Injection	..	716
,, Plasma	.. ..	745
,, Saline Solution	..	742
,, Sugar Solution	..	733
,, Sod. Bic. Solution	..	746
Isotopes	.. ..	XXXVIII
Isopropyl Alc.	.. ..	130
,, Tinctures	.. ..	131
,, Spirits	.. ..	131
Ispaghula, 45 to 150 gr.	..	836
Itrol, 187; Itrosyl	.. ..	119
Ivy	.. ..	833
Ixora, 30 to 45 grs.	.. ..	836
Izal; Caps., Fluid	.. ..	37
Jabon, F.E. = Sapo	.. ..	
Jaborandi, 5 to 60 gr.	..	531 & Vol. II.
Jalapa, 5 to 20 gr., 836; *Jalapæ Resina*, 2 to 5 gr.		836 & Vol. II.
Jalapin, Jalapurgin	.. ..	836
Jamaica Dogwood	.. ..	850
James's Fever Powder		Vol. II.
,, Powder, 3 to 6 gr.	..	178
Japan Wax	.. ..	Vol. II.
Japanese Isinglass	.. ..	807
Jarabe (F.E. = Syrup) Brea	..	690
Jasmine, Yellow	.. ..	437
Jaundice Epid.	..	Vol. II.
Jecovol	.. ..	47
Jelly Fish Stings	.. ..	692
Jenner Centenary Celebrations	.. ..	937
Jennerisation	.. .. ..	934
Jenner's Stain	.. ..	Vol. II.
Jensen's Modified Gram. Method		Vol. II.
Jephson's Powder, 60 gr.	..	770
Jequiritol Serum, Jequirity, 804; Jesuit Tea, 266; Jeyes Fluids	.. .. ..	37
Jodival	.. .. ..	511
Jonnesco's Injections,	..	358
'Joule'	.. .. ..	Vol. II.
Joulie's Phosphate, 752; Ratios		Vol. II.
Jubol Tablets	.. .. ..	807
Juglandin, 2 to 5 gr.	.. ..	837
Jujubes, 442; *see* also Trochisci 'G.'		
Jumble Beads, 804; Juniper Tar Oil, 690; Juniperus	..	837
Juniperus Virginiana	.. ..	820
Jusquiame, 492; Jute	.. ..	448
Juvenia; Ju-vis	.. ..	Vol. II.
Kakodyle	.. .. ..	198
Kala Azar	.. ..	171, 176 179, 1041 & Vol. II.
Kapok	.. ..	448
Kaladana, 837; Kalandura	..	826
Kalmopyrin, 5–15 gr.	.. ..	89
Kamala, 30 to 120 gr.	.. ..	435
Kangaroo Tendon	.. ..	536

NAME. DOSE.	PAGE
Kaolin, ¼ to 1 oz.	154
,, Colloidal	155
Kaposi's Ointment	564
Kaputine; Karox; Kargon	Vol. II.
Kasak, 1 to 2 dr. (children), adult ½ oz., 290; Kasena, 1 dr. (children), adult ½ oz.	290
Kastanol, 806; Kat.	291
Kataphoresis, Vol. II.; Kathions	Vol. II.
Kauri Gum	837
Kavæ Rhizoma	838
Kay's Linseed Comp.; Tic Pills	Vol. II.
Keating's Pectoral Lozenzes	Vol. II.
Keene's Cold Cure ..	Vol. II.
Kefir, 585; Kelene	119
Kelp, Vol. II.; Kelly's Paint	365
Kelpion, 511; Kephaldol, 30 gr.	332
Kelvolin..	37
Kephir	585
Kepler Malt and Oil ..	Vol. II.
Kepad	57
Keratin, 8 gr., and for Pills ..	683
Kermes Minerale	170
Kernel Oil	163
Kerol and Caps.. 37, 525 &	Vol. II.
Kerocain, 1/5 to 1 gr... ..	353
,, with Adrenalin Tabs. and Sols.	353
Kerosene	657
Kharsivan	204
Khat	291
Khoka	337
Kidd's Strychnine Nitrate Solution	767
Kidney Extract	947
Kidney Permeability Tests .. 789 &	Vol. II.
Kieselguhr	156
Kinazyme Tabs..	958
Kinectine	222
Kino, 5 to 20 gr..	838
,, *Eucalypti*, 5 to 20 gr. ..	828
Kineurine, 3 to 8 gr.	44
Kjeldahl Estimation ..	Vol. II.
Kleinenberg's Stains ..	Vol. II.
Klondol	37
Knob Root, 824; Wood ..	867
Knorr's Antipyrine	333
Koko, Vol. II.; Kola Nut, 10 to 20 gr.	266
Kola Wine	Vol. II.
Kolentos, 577; Koleradraaber.	392
Koromiko, 838; Koronium Bromide	762
Kossam Seeds, 816; Koumiss..	585
Kousso, ¼ to ½ oz.	
Krameria, 838; Kreatinin	Vol. II.
Krapp Wurzel	854
Krebisote, 3 to 15 gr... ..	256
Kreochyle	577
Kreosote, 1 to 5 m. incr. ..	392
Kresapol	37
Kresolum (and Liq.)	33
Kryogenin (*vide* Cryogenin).	
Krysolgan	234
Krystall Violet .. 328, 330 &	Vol. II.
Kukui Oil	838
Kurchi 525, 528,	834
Labarraque's Liquor	52
Labdanum	838
Lac Bismuthi, 1 to 2 dr. ..	242
,, ,, et Cerii, 1 to 2 dr...	245
Lacca, 859; Lachnanthes ..	838
Lacmoid, Vol. II.; Lacrymal Secretion, 742; Lactagol, 1 dr., 452; Lacteol	69
Lactic Acid Bacilli Cultures, 69; Liq., 69; Curdled Milk, 70; Dental use, 72; Local use, 71, 72; Suppos. Vaginal, 72; Tablets	69
Lactigen	69
Lactomaltine, 2 dr.	544
Lactobacilline	69
,, Glycogen	70
Lactophosphate de Calcium ..	68
Lactose	839
Lactuca, Lactucarium, 15 gr...	493
Ladanum	838
Ladies' Slipper	826
Lævo-Scopolamine	489
Lævulose	733
,, Test for Liver Efficiency	734
Lake's Lactic Acid Mixture ..	66
Lambert-Towns Method ..	629
Lambkin's Injections, 10 m...	460
Lamblia	Vol. II.
Lamellæ	533
Adrenalin, 1–1000 and 1–500 gr.	964
Alum, 1–250 gr.	151
Atropine, 1–2000 to 1–250 gr.	228
,, (*Off.*), 1–5000 gr.	228, 533
Atropine, 1–5000 to 1–50 / Cocaine, 1–200 to 1–50	228
Cocaine, 1–100, 1–200 gr.; (*Off.*), 1–50; 1/20 gr.	345, 534
Cocaine, 1–5000 to 1–50 / Homatrop, 1–5000 to 1–50	231
Cocaine, 1–200 gr. / Physostig., 1–1000 gr.	681
Eucaine, 1–100, 1–50 gr. ..	351
Gelseminine, 1–500 gr. ..	437
Homatropine, 1–5000, 1–1000, 1–100 gr. (*Off.*) ..	231, 534
Hyd. Perchlor., 1–100,000 gr.	475
Hyoscine, 1–500, 1–200 gr...	490
Hyoscyamine, 1–5000 gr. ..	493
Iodoform, 1–1000 gr. ..	499
Lead Acetate, 1.500 gr., and with Opium, 1–250 gr. ..	
Morphine, (et c. Atrop., 1–5000), 1–500 gr. ..	228, 554
Physostigmine, 1–1000 gr. (*Off.*), 1–500, 1–250 gr.	534, 681
Pilocarpine, 1–500 gr. ..	533

NAME. DOSE.	PAGE
Lamellæ Scopolamine, 1–500, 1–200 gr.	490
Silver Nitrate, 1–500 gr. ..	187
Thymol, 1–1000 gr... ..	784
Zinc Sulph. (et c. Op. et c. Atrop.), 1–250 gr... ..	803
Lamels, Medicated Gelatin, for use *per os*	534
Laminaria Tents.	839
Lamplough's Saline ..	Vol. II.
Lanæ Adeps	111
Landsteiner's Law	975
Langdon Brown's Mixture, 1 oz.	1024
Lange's Gold Test ..	Vol. II.
Langerhan's Islets	642
Lang's Bottle	228
Lano-cyllin	36
Lanolin and Anhydrous, 111; Cream, 111; Ointment ..	111
Lanolinum Hydrargyri. ..	462
Lanosol Silver	389
Lanthanum	Vol. II.
Lapis Calamin, Præp., 801; Divinus	403
Larkspur	861
Lappa, 839; Larch Bark, 687; Lard	806
Larix, 687; Lassar's Paste 731,	801
Lasiosiphon	839
Latapie Syphillis Test..	Vol. II.
Lathyrus	839
Laudanum, 5 to 30 m... ..	631
,, Sydenham's, 5 to 20 m.	632
Laughing Gas	158
Lauri Fruct., Oleum	839
Laurocerasi Folia	163
Lavandula, V. II.; Laveran's Stain	Vol. II.
Laverain Tabs., 5 or 6 p.d. ..	729
Laville's Remedy ..	Vol. II.
Laxans	672
Laxatol, Laxen, Laxoin, ½ to 8 gr.	672
Lawsonia	833
Laxamel	655
Laxar, 1 to 2 dr.	656
Lead as Antiseptic, Vol. II.; Estimation, Vol. II.; Poisoning .. .. 691 &	Vol. II.
Lead Colloidal	381
League of Nations *re* Cocaine, etc.	340
Lebertran	615
Lecithin, 3–5 gr. (and Powder, 10 to 15 gr., 535), 534 &	Vol. II.
Lecithin Copper.	535
Lecitogen, 3 to 4 dr.	535
Lechlanche Cell.. ..	Vol. II.
Leeches, 947; Leek	810
Leek, House	857
Lefroy's Crude Oil Emulsion..	657
Legal's Test	Vol. II.
Leishmania Infns. Antimony in 170; *see* also Therap. Index & Vol. II..	

NAME. DOSE.	PAGE
Leishman-Donovan Bodies	Vol. II.
Leishman's Stain ..	Vol. II.
Leistikow's Bougies	189
Lemon Grass, 847; Juice, 589, 597; Syrup	840
Lenigallol, 77; Lenirobin ..	308
Lenitive Electuary	858
Lentine	321
Leprosy, Bacillus ..	Vol. II.
,, Chaulmoogra in ..	606
,, A self-healing disease..	611
See also Therap. Ind.	1041
Leptandrin, 1¼ to 2 gr. ..	839
Leucin	Vol. II.
Leucocytes	Vol. II.
Leucocytosis	Vol. II.
Levigations	787
Levisticum Officinale	839
Levulose	733
Levure Medicinale . ..	293
Levy-Bing Lafay Syringe ..	461
Libanol	820
Lice, to Kill, *see* Parasites, Animal	1047
Lichenoids, 1 or more.. ..	821
Lichens	Vol. II.
Ligatures *var.*	535
Light Green	331
Light Treatment ..	Vol. II.
Lignum Rhodii..	847
Ligroin	658
Lilac Artificial=Terpineol ..	
Lily of the Valley	824
Lime Salts, Administration and Removal	268 *et seq.*
Limnatis	947
Limonade Purgative; Rogé ..	539
Limonene, 10 to 20 m... ..	839
Limonis Syr.	840
Linct. Ammon. Brom., 1 to 2 dr.	156
,, Apomorphinæ c. Codeina 1 dr.	184
,, Bart's 1 dr.	630
,, Camph. Co., 1 dr. ..	630
,, Codeinæ, 1 to 2 dr. ..	362
,, Expectorans, ½–1 dr. ..	181
,, Gee's, 1 dr.	630
,, Glycerini, 1 dr.	515
,, Heroin, 1 to 2 dr. ..	559
,, Morph., 1 dr.	555
,, Morph. Hydrocyan, 1 dr.	555
,, Opiatus, 1 dr.	630
,, Pini Terp. Herion, 1 dr .	687
,, Scillæ, 1 dr. (and Co.) ..	630
,, ,, Opiatus, 1 dr. ..	630
,, Terp. Pini et Heroin, 1 dr.	687
,, Thymi et Diaphorm, 1 dr.	864
,, Tolu c. Opio, 1 dr. ..	630
Lindenblüthen	497
Liniment, A.B.C	109
Linim. Aconiti and Co. ..	109
,, Aconiti et Chlorof. ..	109
,, Æruginis	401
,, Album, 686; *Ammoniæ*	159
,, Atropinæ	229

NAME.	DOSE.	PAGE
Linim. Belladonnæ	.. ..	238
,, ,, Æthereum	..	239
,, Bellad. c. Chlorof.	..	238
,, Betulæ Co.	.. ..	80
,, Calaminæ,	.. ..	801
,, *Calcis*,	.. .. ..	274
,, ,, Co.	.. ..	802
,, *Camphoræ* et *Ammon.*	..	277
,, Cantharidis Co.	.. ..	282
,, Capsici (and Dx.)	..	287
,, Chloral Co.	.. ..	296
,, *Chloroformi*	.. ..	304
,, Crinale, 282; *Crotonis*	..	846
,, *Hydrargyri*	.. ..	461
,, ,, Oleat. c. Morph.	..	602
,, Iodi, syn. *Tinct. Iodi Fortis*	.. ..	504
,, Jaborandi	.. ..	532
,, Long's	.. ..	686
,, Menthol (& Co.)	..	550
,, Meth. Salicyl.	.. ..	80
,, Myristicæ	.. ..	844
,, *Opii*, 630; Picis	..	691
,, *Potass. Iod. c. Sap.*	..	701
,, St. John Long	.. ..	686
,, Salicyl (Methy.)	..	80
,, *Saponis*	.. ..	737
,, *Sinapis*	.. ..	738
,, Stokes'	.. ..	686
,, Succini Co.	.. ..	861
,, *Terebinth.*	.. ..	686
,, ,, Acet.	.. ..	686
Linseed and Oil	.. ..	840
Linteum Ac. Carbol, 5%	..	19
Linteum Stypticum	.. ..	426
Lints.	.. ..	448
Linum Usitat	.. .. ..	840
Lipase (Lipolytic Ferment)	440, 637, 738 & Vol. II.	
Lipoids	.. ..	535
Lipiodol	.. ..	504
Liqueur de Labarraque	..	52
Liq. Acid. Chromici	.. ..	804
,, ,, Chrom.-Aceto-Osmici		805
,, ,, Hypochlorosi Comp. (Eusol)	.. ..	53
,, ,, Osmici, 2–10 m.	..	805
,, ,, Salicyl.	.. ..	80
,, *Adrenalini Hydrochloricus*, 10 to 30 m.	.. ..	960
,, Alkalinus, Brandish	..	695
,, Alumini Acetici	.. ..	152
,, ,, Aceto-Tart.	.. ..	153
,, ,, Chloridi	.. ..	153
,, Aluminii Formatis	..	153
,, *Ammoniæ*, 10 to 20 m.	..	159
,, ,, Domest.	.. ..	160
,, *Ammon. Fort.*, 3–6 m.	..	160
,, ,, *Acet.*. 2 to 6 dr.		161
,, ,, ,, Fort., '85, 25–75 m.	.. ..	161
,, ,, Anisat.	.. ..	832
,, ,, Aromat	.. ..	162
,, ,, *Cit.*, 2 to 6 dr.	..	161
,, ,, ,, Fort., '85, ½–1½ dr.		161
,, Antiphystericus, ½–1 dr.	..	813

NAME.	DOSE.	PAGE
Liq. Antim. Chlor.	..	Vol. II.
,, Antirheumatic, 30 m.	..	363
,, Antisepticus, 1 dr.	..	12
,, Argenti Nitratis	.. ..	186
,, *Arsenicalis*, 2 to 8 m.	..	192
,, Arsenici Bromatus, 1 to 5 m.		193
,, ,, *HCl*.. 2–8 m.	.. ..	193
,, *Arsen. et Hyd. Iodidi*, 5 to 20 m.	.. .. ..	194
,, Atropinæ Salicyl.	.. ..	227
,, ,, *Sulph.*, 1%, ½ to 1 m.		228
,, Auri.Ars. Brom., 5 to 10 m		233
,, Auri Hyd. Brom.,5 to 10m.		233
,, Bellostii is similar to Millon's Reagent		Vol. II.
,, Berberidis Conc., ½ to 1 dr.		816
,, *Bismuth. Ammon. Cit.*, 30–60 m.	.. .. ..	241
,, Bismuthi Conc.,15 to 30 m.		241
,, Bismuth. Sed., 1 dr.	..	242
,, ,, Tartratis, ½ to 1 dr.	..	253
,, Bituminis	.. .. ..	312
,, Bromi	.. ..	Vol. II.
,, ,, Arsenitis, 1 to 5 m.	..	192
,, Bromo-Chloral Co., ½ to 2 dr.	.. .. ..	296
,, Calcii Chloridi, 15 to 45 m.		272
,, *Calcis*, 1 to 4 oz.	.. ..	274
,, ,, Lactat., ½ oz.	..	67
,, ,, Lactoph.	.. ..	68
,, ,, *Sacch.*, 15 to 60 m.	..	274
,, Calumbæ Conc., ½ to 1 dr. (B.P. '98).		
,, Caoutchouc	.. 284,	738
,, Carbonis, Deterg.	.. ..	312
,, Carmini, 40 gr., 1 oz.	..	819
,, Carnis	.. .. ..	577
,, Caulophylli et Pulsatillæ, 1 to 2 dr.	.. .. ..	820
,, Chiratæ Conc., 1 in 2, ½ to 1 dr. (B.P. '98).		
,, Chloromorph., 5–15 m.	..	304
,, Cocci	.. .. ..	819
,, Cocainæ HCl. (*Inj.*), 5-10 m.		344
,, ,, et Antipyrin	.. ..	345
,, Copaibæ, ½ to 1 dr.	..	624
,, ,, c. Buchu et Cubeba, 1 to 2 dr.	.. ..	624
,, Copaiba et Buchu et Cubebæ c. Santal, 1 to 2 dr.	.. .. ..	624
,, *Cresol Sap.*	35 &	Vol. II.
,, Creosoti, av. 2 dr.	.. ..	393
,, Cuspariæ Conc., 1 in 2, ½ to 1 dr. (B.P. '98).		—
,, Donovani, 5–20 m.	..	194
,, Eastoni pro Syrup., 431; ditto sine Ferro	431,	432
,, *Epispasticus*	.. ..	282
,, Ergotæ Acet., et Ammon., 10–60 m.	.. 419,	420
,, *Ethyl Nitritis*, 15 to 60 m.		119
,, Euonymin et Cascara, ½ to 1 dr.	.. ..	423
,, ,, et Iridin, ½ to 1 dr.	..	423
,, ,, et Pepsini, ½ to 1 dr.		423

NAME.	DOSE.	PAGE
Liq. Ferri Acet.,	5–15 m. ..	429
,, ,,	Albuminati, 1 to 4 dr.	428
,, ,,	et Ammon. Acet., 4 dr.	429
,, ,,	Dialysat., 10 to 30 m.	427
,, ,,	Hypoph. Fort., 10 to 30 m.	678
,,	Iodidi, 4 to 8 m. ..	429
,, ,,	Oxyd. Sacch., ½ oz...	427
,, ,,	Pept. (c. Quin., 428), 1 to 4 dr... ..	428
,,	*Perchlor.*, 5–15 m. ..	426
,, ,,	,, *Fortis*, 1 to 4 m...	426
,, ,,	Pernit., 5–15 m. ..	427
,, ,,	*Persulph.*	—
,, ,,	pro Syr. Easton ..	431
,, ,,	Subsulphat., 3 to 6 m.	433
,, ,,	Tersulphat.	433
,,	Ferro-Mang. Pept., 1 to 4 dr.	428
,,	Ferro-Mang. Pept. c. Hæmoglobin, 1 to 4 dr. ..	428
,,	Fluoresceinæ	673
,,	*Formaldehydi* (*& Sap.*)	134, 138
,,	*Fowleri*, 2 to 8 m... ..	192
,,	Glonoin, ½ to 2 m. ..	570
,,	Gutta Percha	307
,,	*Hamamelidis*, ½ to 3 dr...	454
,,	Helalin c. Pepsin et c. Cascara, 1 dr.	824
,,	Hoffmann	118
,,	*Hyd. Nitratis Acid.* ..	471
,,	,, *Perchlor.*, ½–1 dr. ..	473
,,	Hydrarg. Antiseptic ..	475
,,	*Hydrogenii Perox.*, ½ to 2 dr., 485; Estimation, Preservation, etc.	Vol. II.
,,	Hyoscinæ HBr., 3 to 15 m.	490
,,	Hypophysis, ½ to 1 Cc. intram.	953
,,	Iodi (Co., U.S., 505).	
,,	,, (B.P.'85, 505); Fortis	504
,,	Iodo Ferro Mang. Pept., 1 to 4 dr.	429
,,	Jaborandi, 5 to 15 m. ..	532
,,	Krameriæ Conc., ½ to 1 dr. (B.P. '98).	—
,,	*Mag. Bicarb.*, 1 to 2 oz...	538
,,	,, Cit., av. 12 oz. (div.)	539
,,	*Morphinæ Acet.*, 10 to 60 m.	554
,,	,, Bimec, 1·45%, 5 to 40 m.	556
,,	, *HCl.*, 1%, 10–60 m...	556
,,	,, *Tart.*, 1%, 10–60 m...	553
,,	*Nitroglycerini*, ½–2 m. ..	570
,,	Opii Sedativus, 5–15 m...	630
,,	*Pancreatis*, 1 to 2 dr. ..	639
,,	Pancreaticus, 1–2 dr. ..	640
,,	Papain et Iridin, 2 to 4 dr.	651
,,	Pectoralis, 1 dr.	832
,,	Pepsini et Caffeinæ, 2 to 4 dr.	660
,,	Pepticus, 1 to 2 dr. ..	660
,,	Picis Carbonis, 312; Ligni	312
,,	Picrotoxini, 2 to 12 m. ..	849
,,	Plumbi Lactat.	692
Liq.	*Plumbi Subacet., Dil., Fortis*	692
,,	*Potassæ*, 10 to 30 m. ..	694
,,	Potass. Arsenat. et Bromid., 1 to 5 m.	193
,,	Potass. Arsenit 2–8 m...	192
,,	Potassii et Sodii Hypochloritum, 1½ to 2Cc...	52
,, ,,	*Permang.*, 2–4 dr. ..	—
,,	pro Spirit Arom.	162
,,	pro Syr. Eastoni	431
,,	Quassiæ Conc., ½–1 dr. (B.P. '98)	852
,,	Rhei Conc., ½ to 1 dr. (B.P. '98).	—
,, ,,	Dulc., 1 to 3 dr. ..	413
,,	Rosæ Dulcis	847
,,	Santali c. Buchu et Cubeba, 1 to 2 dr... ..	624
,, ,,	Co., 1 to 2 dr. ..	624
,, ,,	c. Kava, 1 to 2 dr..	625
,,	Sarsæ Co., Conc., 2–8 dr...	856
,,	Sedans, ½ to 1 dr... ..	485
,,	Senegæ Conc., ½–1 dr. ..	858
,,	Sennæ Conc., ½–1 dr. (B.P. '98).	
,,	Sennæ Dulcis, 1–3 dr. ..	858
,,	Seriparus	659
,,	*Sodæ Chlorinatæ*, 10 to 20 m.	52
,,	*Sodii Arsenatis*, 2–8 m. ..	197
,, ,,	Carbolatis	20
,, ,,	Ethylatis	749
,, ,	Glyceroph	44
,, ,,	Hydroxidi, U.S., 5%; P.G.V., 15% ..	—
,, ,,	Hypobrom. ..	Vol. II.
,, ,,	Methylat.	749
,,	Stillingiæ Co., 1 dr. ..	861
,,	*Strych. HCl.*, 2–8 m. ..	766
,,	Testicularis, 15–30 m. ..	965
,,	Thymol, 1 in 800.. ..	784
,,	Thyroidei, 5 to 15 m. ..	968
,, ,,	Assay . ..	Vol. II.
,,	Tolu pro Syrup	815
,,	*Trinitrini*, ½ to 2 m. ..	570
,,	Unoline, ½ oz.	817
,,	Violæ Glucosidi, ½ oz. ..	866
,,	*Zinci Chloridi*	799
Liquores Concentrati		840
Liquorice, 832 & Vol. II.; *Compound Powder of*, 60 to 120 gr., 832; Liquorice (Indian)		804
Listerine, 1 to 2 dr.		12
Lister's Antiseptic		466
,, Carb. Bdges		19
,, Fumigators		135
Litharge..		693
"Lithiated Sorghum Co." ..		859
Lithii Aceto-Salicylas, 5 to 15 gr.		92
,, Agaricinas..		808
,, Benzoas, 2 to 10 gr. ..		537
,, Bismuth. Cit., 2 to 5 gr...		242
,, Bromid., 5–15 gr... ..		537
Lithii Carb., 2 to 5 gr... ..		537

NAME.	DOSE.	PAGE
Lithii Citras, 5 to 10 gr., 537; Effervesc. (and Lax. U.S.), 1–2 dr...	..	537
,, Formas, 1 to 5 gr.	..	40
,, Glyceroph., 3–10 gr.	..	44
,, Guaiacas, 2 to 5 gr.	..	537
,, Hippuras, 5 gr. incr.	..	537
,, Iodidum, 1 to 5 gr.	..	538
,, Phenyl-cinchoninate	..	328
,, Quinas, 5 to 15 gr.	..	710
,, Salicylas (Eff., 1 to 2 dr., 538) 5–20 gr...	..	538
Lithii Sulphas., 5 to 10 gr.	..	538
,, Sulpho-Ichthyolas, 10 to 30 gr. daily	.. ..	495
,, Tart. Acid., 5–20 gr.	..	538
Lithion, ½ to 1 dr.	.. ..	538
Lithium		537
,, Diuretin, 5–15 gr.	..	779
Litmus Paper, Solutions, Broth, Milk	Vol.	II.
Liver Abscess ..	517 & Vol.	II.
,, of Sulphur	.. ..	695
,, Desicc., 5 gr. incr.	..	948
,, Extract, 20 Cc. ..	..	947
Livingstone Rousers	.. ..	727
Lobelia		840
Lockyer's Hair Restorer	Vol.	II.
Locock's Wafers. ..	Vol.	II.
Locke's Solutions ..	..	742
Loeffler's Meth. Blue, Serum	Vol.	II.
,, Pigment (Diph.)..	..	426
Logwood		833
London Paste		695
Lonicera *var*		840
'Lords and Ladies'		813
Loretin		328
Lotio A.B.C.		109
,, Acid. Acetici		6
,, ,, Benzoic		8
,, ,, Borici, 4%		12
,, ,, ,, c. Zinc Sulph...		12
,, ,, Carbolici (et c. Cocaina)		18
,, ,, Citrici et Phenolis..		33
,, ,, Hydrocyan. c. Sodio		51
,, ,, Picric, 1% . ..		75
,, ,, Tannic Sulph. ..		106
,, Ætheris Composita ..		118
,, Ammonii Chloridi ..		157
,, Balsami Peruvian ..		814
,, Bœck		692
,, Calaminæ (Oleosa, 802)..		802
,, Calcii Sulphurat. . ..		275
,, Calc. Iodat., 64; Capillaris		731
,, Creolin, 36; Crinalis, 296; Evaporans, ..	130,	157
,, Excitans		731
,, Hyd. Acetica, 474; Biniodidi, 470; *Flava*, 473; *Nigra*, 480; Perchlor., 474; c. Acid. Carbol., 474		
,, Krameriæ Co.		9
Lotio Paraffini Co.		658
,, Parasiticide		474
,, Picis Carb. Alk. Arom...		312
,, Pilocarpinæ (hair) ..		533
,, Plumbi Detergens ..		312
,, ,, Evaporans ..		692
,, ,, et Opii, Solubes ..		692
,, ,, Lact.		692
,, Plumbi Spirituosa ..		692
,, ,, Talc et Amyli ..		692
,, Pot. Thymatis		784
,, pro Acne		802
,, pro Capite		861
,, Proflavine		319
,, Quassiæ		852
,, Quininæ HCl.		712
,, Resorcini (and Co.) ..		730
,, ,, et Ac. Borici ..		731
,, ,, et Acid Salicyl ..		731
,, ,, Pilocarp. et Canth.		731
,, Rubra		803
,, Salox		487
,, Staphisag..		861
,, Sulphatum		803
,, Sulph. et c. Sapone ..		771
,, ,, Co.		772
,, Zinci Chloridi		800
,, ,, Sulphatis		803
Lotion Ammoniacale Camphrée		277
Lovage		839
Lœwenthal's Serum		965
Lowndes Cream; *vide* Cremor		
Lozenges, Bases for, 787; *See* also Trochisci.		
Luatol		254
Lubricant Glyc. Jelly		441
Lubricant Surgical		19
Lubricating Oils.		657
Luetin	Vol.	II.
Lugol's Solution = Liq. Iodi, '85, 5 to 10 m.		505
Lumbar Anæsthesia		350
Lumbricus, 734 and Therap. Index.		
Luminal, 1½ to 5 gr. 795 &	Vol.	II.
,, Sodium (20% Soln. Hypod.), 2 to 3 Cc. ..		795
,, in Epilepsy		795
Luminous Paints ..	Vol.	II.
Lunar Caustic, 185; *Mitigated*, *Toughened*		187
Lund's Oil		19
Lupulin (Lupulus), 2 to 5 gr...		840
Lycoperdon Gig..		840
Lycopodium		840
Lycryl, 37; Lyddite ..	Vol.	II.
Lymph, Calf, Glycerinated ..		934
,, Serum		965
Lymphatic Gland Tabs., 5 gr.		948
Lymphoid Compound Caps. ..		965
Lysidine		459
Lysoform, 137; *see* also Formosyl		
Lysol		35, 38

NAME. DOSE.	PAGE
Lysol, Martindale	36
Lytta, $\frac{1}{16}$ gr.	281
McBride's Treatment	226
McConkey's Broth, etc..	Vol. II.
McDade's Succus, 1 dr.. ..	861
McDonagh's Preps.	772
Mache Unit	Vol. II.
Mackintosh Paste	738
,, Sheeting	285
Mackenzie's Cure, Vol. II; Eye-wash	475
Maclean's Blood, Eng. Edn.	Vol. II.
Madder	854
Magenta, $\frac{1}{2}$ to 4 gr., 328; Acid..	V. II.
Magisal, 5 to 15 gr.	92
M.L.D.=Minimum Lethal dose	V.II.
Magisterium Bismuthi.. ..	246
Magma Bismuthi, 1 dr.. ..	243
Magnesia Cream, 1 to 4 dr. ..	539
,, Mixture	V. II.
Magnesia Levis and *Pond.*, 30 to 60 gr., 5 to 20 gr. rep...	539
Mag. Acetyl-Salicyl, 5 to 15 gr.	92
,, Benzoas, 5 to 15 gr. ..	9
,, Borocit, 15 to 30 gr. ..	14
,, Bromid., 10 to 20 gr. ..	257
,, Cacodylas, $\frac{3}{4}$ gr... ..	198
,, *Carb. Levis., Pond.*, 30 to 60; 5 to 20 gr. rep...	538
,, Chaulmoograte	610
,, Chloras	539
,, Chloridum, 30 gr. or more	539
,, Citras Ver., 30 to 120 gr.	
,, Formas, 3 to 10 gr. ..	40
,, Glyceroph., 3–10 gr. ..	44
,, Hydrox., 5 to 120 gr. ..	539
,, Hydrox., c. Carbone, 1 to 2 dr.	539
,, Hypochlorite	59
,, Hypophos., 3–10 gr. ..	678
,, Lactas, 15 to 60 gr. ..	540
,, Oleas	606
,, Peroxid., 15 to 60 gr. ..	487
,, Pyrophosphas ..	Vol. II.
,, Ricinoleas, 1 to 4 dr. ..	622
,, Salicyl, 10 to 30 gr. ..	82
,, Silicas	156
,, *Sulphas*, $\frac{1}{4}$–$\frac{1}{2}$ oz.; 30–90 gr. rep...	540 & Vol. II.
,, *Sulphas Eff.*, $\frac{1}{2}$–1 oz.; 60–180 gr. rep.	542
,, Sulphas Exsicc.	542
,, Sulphate Cream.. ..	541
,, Sulphis, 10 to 30 gr. ..	105
Magnesium ..	538 & Vol. II.
Maguey	851
Maidis Stigmata, 841; Ustillago, 841; Maize Ergot, 841; Oil	619
Malachite Green.	329
Malabar Fibre	536
Malaria, 902, 1042, 1043 and Ther. Ind., 1042; Etiology, Vol. II.; in England, Measures against..	723
Malaria in Macedonia ..	715
,, Inter. Health Board on..	721
,, Relapses, 714, 722; War Experiences	720
,, Quinidine & Cinchonidine in.. ..	703, 712–725
,, Quinine in	902
,, Sir R. Ross on	714
,, Types and Parasites	Vol. II.
,, ,, Staining Methods	Vol. II.
Male Fern (Caps.)	434
Malignant Œdema ..	Vol. II.
Malignant Purpuric Fever ..	885
Malignant Pustule	881
Mallein	Vol. II.
Malonal, *Malonurea*, 5 to10 grs.	790
,, Identification ..	Vol. II.
Malt, 542; Assay of ..	Vol. II.
,, Incompats. with 543 &	Vol. II.
,, Extract, 1 to 4 dr. ..	542
,, and Cascara, 1 to 4 dr...	544
,, ,, Hæmoglobin, 1 to 4 dr.	544
,, ,, Hypophosph. (and with Oil), 1 to 4 dr.	543
Malta Fever	Vol. II.
Maltaffin and combinations, 1 to 2 dr.	543
Malted Glyceroph., 1 to 4 dr...	46
Malti Pulvis, 1 to 2 dr... ..	542
Maltine and Preps., 1 to 4 dr...	543
Maltoferrose, 1 to 4 dr. ..	544
Maltolivine, 2 to 4 dr... ..	619
Malva	497
Manaca	841
Mandl's Pigment	505
Mandrake, 841; Amer.. ..	693
Manganese Colloidal	382
Mangan. Brom., 1 to 3 gr. ..	257
,, Butyrat	545
,, Citras, 3 to 5 gr... ..	545
,, Ferro Phosph., 3 to 10 gr.	545
,, Glyceroph., 1 to 5 gr. ..	44
,, Hydrat. Colloid.. ..	372
,, Hypoph., 1–10 gr. ..	545
,, Ox. Præcip., 3–10 gr. ..	545
,, Phosph., 1 to 5 gr. ..	546
,, Sulph., 2 to 10 gr. ..	546
Manna, 1 dr. to 1 oz... ..	841
Manihot..	811
Manilla Grain	812
Mannitol, (Syn. Mannite) ..	841
,, Nitrate Tabs., 1 gr. ..	421
Manures, Artificial ..	Vol. II.
Maran (W. Indies)=Bals. Copaibæ	—
Maranta..	787, 841
Margarine, V. II.; Mariani Wine	V.II.
Margosa Seeds	814
Maricol, 1 to 4 dr.	622
Marienbad Salt & Tabs., 60 gr.	754
,, Tab. (vegetable) ..	151
,, Antiobesity Tabs. ..	754
Marigold=Calendula	817
Marjoram	847
Marmite.. ..	293 & Vol. II.

NAME.	DOSE.	PAGE
Marrow, Glyc. Ext.	.. ..	944
Marrubin, 1 to 2 dr.	.. ..	944
,, Compounds	.. ..	945
Marrubium, av. 30 gr.	.. ..	841
Marsh Mallow, 497, 810; Pastils, 442; Marsh's Test	..	Vol. II.
Marylebone Cream	.. ..	598
Massicot	.. ..	693
Mastiche	.. .. ..	841
Mastich Leaf Oil	.. ..	842
Mastisol	.. ..	841
Maté	.. ..	266
Matricaria Chamomilla	..	812
Maubeere, 854; Mauve (Malva)		497
Mauveine HCl.	.. .. ..	466
May Apple	.. .. ..	693
May-Grunwald Stain	..	Vol. II.
Mayer's Stains	.. ..	Vol. II.
Mayer's Reagent	..	Vol. II.
Meadow Saffron.	.. ..	362
Mead's Maltose	.. ..	544
Measles, 976; & Therap Index.		976
Meat Extracts, 575 *et seq.*; Juice		575, 576
,, Preps.	.. .. ..	576
Mechoacan	.. .. ..	836
Meconine	.. ..	Vol. II.
Meconin-Morphine-Narcotine	.	562
Medicated Dressings	.. ..	447
,, Wines	.. ..	Vol. II.
Medicine Stamp Acts	..	Vol. II.
Medinal, 5 to 10 gr.	793 &	Vol. II.
Mediterranean Fever	..	Vol. II.
Medullary Glyceride, 1–2 dr.	..	944
Meglin's Pill	.. .. ..	493
Melograno	.. .. ..	658
Melaleuca.	.. ..	817, 842
Mel Depuratum, V. II.; Rosatum	.. ..	854
Melissa Off.	.. .. ..	842
Melia Azadirachta	.. ..	814
Mellitum Mercurialis from M. Annua *v.* FR. CX.	..	
Melon Pumpkin Seeds	.. ..	825
Melting Points of Fats	..	Vol. II.
Membroids, 514; Memoranda		XXXIV.
Menciere's Solutions	.. ..	499
Mendeléeff's Periodic Table		Vol. II.
Mene Towels	.. .. ..	449
Meningitis, Cerebro-Spinal,	..	885
,, Serum	.. .. ..	888
,, Conf. on Standn. of Serum		889
Meningococcus, Types of, 886; Culture Media, 887; Swab for		887
Menispermin, 1 to 5 gr.	..	849
Menstruation, Diapers of Cotton, 449; Moss	.. .. ..	760
Mentha Piperita et Viridis	..	842
Menthol, ½ to 2 gr.	549 &	Vol. II.
,, Camphora et c. Phenol	..	549
,, Paraffin Caps	.. ..	550
,, Plaster	.. .. ..	550
,, Snuff, 550; Spray; Wool, 551; Valerianate		551

NAME.	DOSE.	PAGE
Mentholeate, 550; Mentho-Phenol	.. .. ..	549
Menyanthes	.. .. ..	842
Mercaptan	.. .. ..	768
Mercurettes	.. .. ..	461
Mercurial Cream, 10 m.	.. ..	460
,, Injections Intrav.	.. ..	461
Mercurialised Serum	.. ..	477
Mercuric Ammon. Chloride	..	463
,, Benzoate, $\frac{1}{50}$ to $\frac{1}{10}$ gr.	..	464
,, *Biniodide*, $\frac{1}{32}$ to $\frac{1}{16}$ gr.	..	467
,, Iodide Soaps, 470; Wool		468
,, Nitrate Ointment	..	471
,, Oleate and Comps.	..	602
,, Oxide Yellow, 481; Red		482
,, Oxysulph.	.. .. ..	481
,, Potass. Iodide, 1/16-1/4 gr.		469
,, Rhodanide	.. ..	483
Vide also Hydrarg.		
Mercurius Dulcis	.. ..	478
Mercurochrome "220"	..	674
,, Sterules, Vesic. Injn.	..	674
Mercuro Zinc Cy., 466; Bandages, Cream, Gargle, Gauze, Paste, Wool, etc., 467 *et seq.*		
Mercurol	.. ..	294, 462
Mercurosal	.. .. ..	478
Mercurous Chloride, 478; Iodide, 470; Lactate, 471; Nitrate, 471; Oxide	.. .. ..	480
Vide also Hydrarg.		
Mercury Amalgam	.. ..	463
,, Hexamine Salts	.. ..	483
,, Isotopes of	..	Vol. II.
,, Vapour Lamp	..	Vol. II.
,, Vasogen	.. .. ..	658
Mescal Buttons	.. ..	812
Mesentery Gland	.. ..	948
Mesothorium	.. ..	Vol. II.
Meta-benz.-carbazide	.. ..	10
,, cresol	.. .. ..	34
,, Diamidobenzol	..	Vol. II.
,, -dihydroxybenzene	..	730
,, -phenylene diamine and HCl.	..	321 & Vol. II.
Metagen	.. ..	598
Metaldehyde	.. .. ..	133
Metals, Action of Acids on		Vol. II.
,, Colloidal	.. ..	366
,, Ionised	.. ..	Vol. II.
Metallic Oleates	.. .. ..	601
Metchnikoff's treatment	..	69
Methanal	.. .. ..	134
Methyl-acetanilide, ½–2 gr.	..	4
,, Alcohol	..	128 & Vol. II.
,, Aldehyde	.. ..	134
,, Amidobenzaldehyde (p.)		V. II.
,, Amidophenol, HCl.		Vol. II.
,, Amino-oxy-benzoate	..	352
,, Atropine Brom. and Nit.		230, 232
,, Benzol	.. .. ..	325
,, Benzoyl Ecognine	..	338
,, Chloridum	.. ..	842
,, Codeine Bromide, ¾ gr.	..	362

NAME.	DOSE.	PAGE
Methyl Cupreine	..	399
,, Cytisine	..	820
,, Ditannin	..	107
,, Eosin	..	Vol. II.
,, Green	..	331
,, Heptyl. Ketone	..	855
,, Hydro-Cupreine HCl.	4 to 12 gr. ..	400
,, -hydroxybenzene	..	33
,, Iodide	..	122
,, Morphine=Codeine,	*q.v.*	
,, -nonyl-ketone	..	855
,, Nitrate	..	574
,, Orange, V. II. ; Phenol	..	33
,, propyl-phen. Hexa hyd.		549
,, psychotrine	..	531
,, -protocatechuic Ald.	..	865
,, Rosanilin	..	328
,, -*Salicyl* (Plaster 80),	5 to 15 m. ..	79
,, *Sulphonal*,	10 to 20 gr. ..	769
,, -Theobromine	..	262
,, Thioninæ HCl.	..	331
,, Violet	..	328
,, Xanthines	..	262, 778
Methylated Spirit (Mineralised and Industrial)	..	128
Methylene Azur V. II. ; Blue,	1 to 4 gr. ..	331 & Vol. II.
,, Blue Kidney Test, Stains	..	Vol. II.
,, Chloride	..	843
Methylene-di-salicylic Iodide		500
Methylenum Cœruleum	..	331
Methylic Alcohol	..	128
Methysal Balm	..	79
Metol, 321 ; Developer		Vol. II.
Metramine	..	456
Metric Wts., etc., xxx.	*et seq.*	
Mezereon, av. 7½ gr.	..	843
Microbene	..	38
Micrococcus Catarrhalis	..	883
,, Gonorrhœa	..	Vol. II.
,, Melitensis	..	Vol. II.
,, Meningitis	..	887
Microscopic Jelly, Mtg. Media, etc.	..	Vol. II.
,, Varnish	..	841
Microcurie	..	Vol. II.
Microsporon Audouini, etc.		Vol. II.
Midges	..	1011 & Vol. II.
Migraine Powders		265 & Vol. II.
Migrainine, 8 to 15 gr.	..	265
Migralgin, 8 to 15 gr.	..	265
Milk, Analysis, V. II. ; Artificial Human, 580 ; Asses', V. II. ; Bact. Medium, V. II. ; Bacteriological Examination of, V. II. ; B. Tuberculosis in, 583 & V. II. ; Bills, V. II. ; Boiled *v.* unboiled, 583 ; Citrated 581 ; Condensed, 584 ; Cows', 580, 585 ; Curdled, 70 ; Dried, 579 ; Analysis of Dried 579 ; Foods, 581 ; Milk. and Glycerophosphate, 43 ; Goats, 585 ; Govt., V. II. ; Grade A. and Certified, V. II. ; Human Normal 580, 585 ; Humanised, 580 ; Hypersensitiveness 663, 671 ; Infns. Steril. 5 to 10 Cc., intram. 671 ; National Conf., 580 ; "Nursery," 581 ; Pasteurised, 582 ; Peptonised, 640 ; Preps., 578 ; Sour, 70 ; Sterilised, 582 ; for injection, 671 ; Sugar, 839 ; Synthetic, 588 ; Thickeners, V. II. ; "Upper," 579 ; Whey Powder	..	585
Miller's Mouth Wash	..	9
Milliampere and Millicurie		Vol. II.
Milne's Battistie	..	447
,, Eucalypt. Inunction	..	614
Millon's Reagent	..	Vol. II.
Milton	..	59
Mineral Naphtha	..	128, 657
Mineralised Meth. Spirit	..	128
Mineral Waters, Vol. II. Artif. Sera	..	745
Minchin's Garlic Preps.	..	809
Minium=Red Lead	..	693
Mirbane	..	323
Mistletoe, 10 to 60 gr.	....	866
Mist. Ac. Aceto Salicyl, ½ oz.	..	88
,, Ætheris, c. Ammon., ½ oz.		118
,, Camph, 1 oz.	..	118
,, Agrimoniæ Co., ½ oz.	..	808
,, Alba, ½ to 2 oz.	..	542
,, *Ammoniaci*, ½ to 1 oz.	..	
,, Ammon. Brom. Phenazoni et Caffeinæ, 1 oz.	..	156
,, Ammon. c. Ether, 1 oz.		118
,, Ammon. Picratis, ½ oz.	..	76
,, *Amygdalæ*, ½ to 1 oz.	..	164
,, Anodyna, ½ oz.	..	556
,, Anticachexia, No. 1, 2 & 3, 1 oz.	..	714
,, Anticatarrhalis, 1½ oz.	..	161
,, Anti-chloraic (2), 1 oz.	..	392
,, Anti-dipsom, ½ oz.	226,	310
,, Antim. et Pot. Iod. (Castellani), 1 oz.	..	175
,, Antiseptica, ½ oz.	..	752
,, Antispasmodica, ½ oz.	..	762
,, Apomorphine Co. Luff., ½ oz.	..	184
,, Arsenii Quininæ et Ferri ½ to 1 oz.	..	193
,, Arsenii et Hydragyri Iodidi cum Phenazono, ½ oz.		195
,, Asthmatica, ½ oz.	..	762
,, Bacelli, ½ to 1 oz.	..	193
,, Belladonna, Xanthoxyli et Hyoscy., 6 to 8 mins.	..	239
,, Bismuthi, 1 oz.	..	240
,, Bismuth Astring, 1 dr.	..	240
,, ,, c. pepsina, 1 to 2 dr.	..	242

NAME.	DOSE.	PAGE
Mist. Bismuthi, Phenolis et Morph., 1 oz.	.. ..	243
,, Boro-Benzoat., 1 oz.	..	9
,, Broadbent, ½ oz...	..	726
,, Brominol c. Nuc. Vom., ½ oz.	.. .. ..	258
,, Bromoformi, 2–4 dr.	..	259
,, Butyl-Choral, 1 oz.	..	260
,, Calcii Hypoph., 1 oz.	..	678
,, Calc. Lact. Rec., ½ to 2 oz.		67
,, Camphoræ, 277; Conc...		184
,, Capsici Sed., ½ oz.	..	287
,, Carminativa, ½ oz.	..	868
,, Cascaræ, 1 dr.	.. ..	290
,, Catarrhalis Anti- 1½ oz.	.	161
,, Chest, 1 dr.	.. ..	832
,, Chlori c. Quin., 1 oz., (Yeo's), 724; Roseberry's	.. ..	725
,, Cholera, 1 oz.	.. ..	392
,, Copaibæ, ½ to 1 oz.	..	624
,, Creosoti, ½ to 1 oz.	..	
,, ,, Co., 2 dr.	.. ..	394
,, Creosoti et Potass. Iodid. ½ oz., *quartis horis*	393,	700
Cretæ, ½ to 1 oz.	.. ..	267
,, Damianæ Co., 1–2 dr.	..	827
,, Diarrhœa, Bd. Hlth., 1 oz.		392
,, Diuretica, 1 oz.	.. ..	695
,, Dysmenorrh. ½ oz.	..	696
,, Eserinæ Co., ½ oz.	..	682
,, Ergotæ Sedativa, 1 oz...		420
,, ,, Co., ½ oz.	..	420
,, Exalgin, 2 to 4 dr.	..	4
,, Febrifuga, ½ oz.	..	161
,, Ferri Aper., 1 oz.	..	427
,, ,, Aromat., '85, 1 to 2 oz.		
,, ,, Arsen., ½–1 oz.	..	427
,, ,, *Co.*, ½ to 1 oz.	..	
,, ,, Salicyl. 1 to 2 dr.	..	82
,, ,, Salina, 1 oz.	..	427
,, Filicis, 1 oz.	.. ..	435
,, Gentianæ Alk., 1 oz.	..	831
,, *Guaiaci*, ½ to 1 oz.	..	
,, Guaiacol, 1 oz.	.. ..	396
,, ,, c. Quinina, ½ to 2 dr.		396
,, Hepatica, 1 to 2 dr.	..	290
,, Hyd. Biniodidi, *var.*	..	469
,, ,, Perchlor., 1 dr.	..	474
,, ,, ,, Co., ½ oz.	..	474
,, Hydrarsan, ½ oz.	..	195
,, Hydrastis Co., 1 oz.	..	484
,, ,, et Ergot, 1 oz.	..	484
,, Ichthyol, 1 to 3 dr.	..	495
,, Iodi Co., 1 dr.	.. ..	505
,, Ixoræ, 1 oz. inc.	.. ..	836
,, Langdon Brown's, 1 oz...		1024
,, Mag. Suph. Co. (Mist. Alba), ½ to 2 oz.	..	542
,, Malarial, Anti-, 1 oz.	..	714
,, Morph. et Phenazon Co., 1 oz.	.. .. ..	555
,, Moschi, 1 oz.	.. ..	843
,, Mucilag.	.. .. ..	769
Mist. *Olei Ricini*, 1 to 2 oz.	..	—
,, Olei Santali, 1 oz.	..	624
,, Oleo-balsamica, 1 to 4 dr.		784
,, Paraldehydi, 1–2 oz.	..	133
,, Parald. et Pot. Iod., 1 dr.		133
,, "Patent".	.. ..	118
,, ,, Camph.	.. ..	118
,, Phenazon. Expect., 1 to 2 dr.	.. .. ..	335
,, Pot. Iod. c. Lob., ½ oz...		762
,, Quininæ c. Ferro, ½ oz. *t.d.*		712
,, ,, Co., ½ oz.	.. ..	726
,, ,, Eff...	.. ..	725
,, Roseberry's, 1 oz.	..	725
,, Rubra, *q.s.*	.. ..	751
,, Santali Co., ½–1 dr.	..	624
,, Senecio Co.	.. ..	858
,, *Sennæ Co.*, 1 to 2 oz.	..	858
,, Simarubæ et Granati	..	859
,, Sod. Ac. Phos., ½ oz., 751; Co., ½ oz.	.. ..	752
,, Sodæ cum Opio, 1 oz.	..	630
,, Sodii Iodid, Co., 1 dr.	..	750
,, ,, Salicyl. 1 oz.	..	85
,, Strych. Phosp., 1 oz.	..	766
,, Sp. Vini Gall., B. P. '98, 1-2 oz.		
,, Theilemàni, av. 30 min...		392
,, Tussi Rubra, ½–2 dr.	..	555
,, Tussis Luff, ½ oz.	..	184
,, Valerianæ Co., 1 oz.	..	797
,, Zinc Ox. (*etc. op.*), 1 dr...		800
Mitigated Caustic	.. ..	187
Modelling Wax	.. ..	653
Molasses	.. .. ..	7, 843
Mollin, 843; Molybdenum, 433; Molybdenite, 433; Momordicin	.. ..	827
Monarda, 782; Monazite 780 &		V. II.
Monkey Serum	.. ..	Vol. II
Monilia balcanica	..	Vol. II.
Monochlorbenzene	.. ..	323
Monochlorphenol	.. ..	24
Monsel's Salt and Sol., 3–6 m...		433
Monsonia, *var*	.. .. ..	843
Moodooga Oil	.. .. ..	817
Moogrol	.. ..	610
Moorhof's Paste	.. ..	500
Morbilli, 976; Mori Succus	..	843
Morison's B.I.P.P.	.. ..	246
,, Pills	.. ..	Vol. II.
Morning Glory	.. .. ..	836
Moro's Tuberculin Test.	..	929
Morphina, 1–10 to ⅓ gr. 551 &		Vol. II.
,, Steriloids	.. ..	144
Morphinæ Acetas, 554; Diacetyl. and HCl., 1/24 to 1/12 gr., (and Base) 559; HBr., *HCl.*, 555; Meconas, 556; Periodid., 1/16 to ⅛ gr., 148, 557; Sulphas, 557; Hypophosphis, ⅛ to ½ gr., 556; *Tartras*, each 1/8 to ½ gr., 557; Oleatum (1 to 60)	.. ..	554
Morphinæ Methyl Brom., hyp., ⅛–½ gr.	.. ..	560

NAME.	DOSE.	PAGE
Morphinæ Methyl Chlorid.	..	560
Morphine Habit .	.. ..	553
,, Emetine in..	..	554
,, Gold in	.. ..	380
,, Narcotine Meconate,	⅓ to ½ gr.	562
,, Scopolamine	.. ..	490
Morphosan Hypod., ⅛ to ¼ gr...		560
Morton's Fluid ..	.. ..	503
Morus Nigra, 843; Moschus, 5–10 gr.	.. .. ..	843
Mosaic Disease ..	.. ..	859
Moss Accouchement Sheets, Compressed Sheets, Dressings Loose, Felt, Gauze-Covered Towels, Pillows, Sterilisation		758
Mosquitoes and Malaria 723 &		Vol. II.
,, Plant	.. ..	846
,, to ward off	..	Vol. II.
,, and Bites and Stings..		1011
Moss, Iceland, 821; Irish	..	823
Mothersill's Remedy ..		Vol. II.
Motor Spirit ..323, 657 &		Vol. II.
Mountain Ash ..	.. ..	859
,, Damson	.. ..	859
Mouth Washes, 107, Permang., 547; Peroxide.	.. ..	486
Mowra ..	.. .. ..	815
Much's Modified Gram.		Vol. II.
Mucilage Acaciæ, ad lib.	..	1.
,, Amyli, 12 gr. to 1 oz.		..
,, Bismuthi ..	.. ..	244
,, Cydonii ..	.. ..	826
,, *Gummi Indici*	.. ..	2
,, Marantæ ..	.. ..	787
,, Salep	.. .. ..	855
,, Psyllii	.. .. ..	851
,, Symphiti ..	.. ..	862
,, *Tragacanthæ*	.. ..	787
,, Ulmi, 4 dr.	.. ..	864
Mucogene Caps., 2 to 3	..	291
Mucin, 5 to 10 gr. 948 &		Vol. II.
Mucuna Pruriens, 1 to 2 gr...		435
Muirapuama ..	.. ..	843
Mulberry Juice..	.. ..	843
Mullein, Great ..	.. ..	865
Mulls, Adepsine, Anserine		562, 563
Thiosinamin ..	.. ..	740
Mumps, 976; Munyon's Preps..		V. II.
Murexide ..	..	Vol. II.
Murray on Goitre	.. ..	699
,, on Thyroid	..	967, 973
Muscarine ..	..	7, 808
Mushroom Poisoning. *See* Fungi in Antidotes to Poisons.		
Musterole ..	.. ..	739
Musk (and artif.)	..	327, 843
,, Root ..	.. ..	861
Muskatbalsam .	.. ..	844
Muslin, 448; Mustard..	..	738
Mustard Gas ..	.. ..	1064
Muthanol ..	.. ..	255
,, Suppos. ..	.. ..	256
Muthu's Inhalants ..	..	136
Mutton Bird Oil, 618; Essences		576

NAME.	DOSE.	PAGE
Mycetol ..	.. .. ..	38
Mydriasine, 230; Myelin	..	945
Myelocene, 10 drops or more..		945
Mylabris *sp.*	.. .. ..	281
Myrica Acris, 127; Myrica Gale		816
Myricin, 2 to 5 gr.	.. ..	844
Myristica; Myristicin ..	..	844
Myrobalanum, ½ to 1 dr.	..	827
Myrosin ..	.. ..	Vol. II.
Myrrh, 5 to 15 gr.	.. ..	844
Myrtillus, 844; Myrtol, 5 to 15m.		844
Myrtus Chekan..	.. ..	822
"N.C.I." ..	.. .. ..	566
N.E.M. ..	.. .. ..	588
Nabarro on Tick Fever and Sleeping Sickness ..		Vol. II.
Nagana ..	.. ..	Vol. II.
Nail Polish	.. ..	860
Naphthalene, 2 to 15 gr.	..	565
,, Tetrachlor. (HCl.), 3 to 12 gr. .	..	525, 566
Naphtha Mineral	..	128, 657
,, Solvent, 325; Wood	..	128
Naphthalol, 3 to 8 gr...	..	565
Naphthol *a*-, 2 to 5 gr. or more		564
,, *B*-, 3 to 10 gr.	.. ..	563
,, Benzoate ..	.. ..	564
Naphthol-Camph. Oxidised ..		564
Naphthol Bismuth, 10 to 30 gr.		250
,, Charcoal, 564; Salicyl ..		565
Naranja, F.E. = Aurantii Amaræ Cortex.		
Narceina, 1–8 to 1 gr. ..	..	845
Narcophin ..	.. ..	562
Narcotic Drugs Combinations..		561
Narcotina, 1 to 3 gr. ..	..	566
Narcyl, 1 gr. *p.d.*, 845; Nargentol, 294; Nargol	.. ..	294
Nasal Douches (*et v.* Collunaria)		285
,, Bougies ..	.. ..	257
Nascent Iodine..	.. ..	502
Natto ..	.. .. ..	860
National Insurance in D.D.A. *See* D.D.A.		
N.H.I. Dressings	.. ..	451
Natrium, *see* Sodii	.. ..	
Nativelle's Digitaline Granules, $\frac{1}{100}$ and $\frac{1}{200}$ gr.	..	411
,, ,, Solution, 1 Cc.	..	411
Nauheim Baths, 271; Salts ..		753
Neatsfoot Oil ..	..	Vol. II.
Nebulæ ..	.. ..	567
Nebula Acid Boric	.. ..	567
,, Acid Lactic	.. ..	66
,, Acid Tannic T.H.	..	567
,, Alkalina ..	..	567, 747
,, Aluminis, 5 to 15 gr. to oz.		
,, Analgesic..	.. ..	567
,, Antiasthmatica ..	..	567
,, Antipyrini	.. ..	568
,, Antiseptic	.. ..	567
,, Astringent; Catarrh	..	568
,, Chlorbutol Co.	.. ..	568
,, Cocainæ HCl.	.. ..	345
,, Cocainæ Co.	.. ..	568

NAME. DOSE.	PAGE
Nebula Cocainæ Oleosa ..	341
,, Creosoti Co., 568; Cupri Sulph.	568
,, Diphtheria	568
,, Eucain HCl.	351
,, Eucalypti, 568; Co. ..	615
,, Ext. Supra-renal 568,	959
,, Ferri Perchlor	426
,, Formaldehyd. Muthu ..	136
,, Hay Fever.	568
,, Hydrarg. Nit.	472
,, Iodoformi, 40 gr. to oz. Ether	
,, Iodi Co., 568; Lobeliæ Co.	567
,, Menthol (Co., 568) ..	550
,, Mucin	948
,, Phthisis, 568; Pini Co. (et c. Cocaine).. ..	568
,, Potass. Chlor. c. Ferro ..	568
,, Potassii Permang. ..	567
,, (Potass. Permang. 1 gr., Sodii Chlorid, 5 grs., Water to 1 oz.). ..	567
,, Quinin Antiseptica ..	568
,, Resorcini.. .. 568,	731
,, Sodii Bicarb.	747
,, Sodii Salicyl, 20 gr. to oz. Aq.	
,, Stimulant	568
,, Suprarenal. .. 568,	959
,, Tonic	568
,, Zinci Chlor. vel Sulph., 10 to 25 gr. in oz...	568
,, ,, Sulphocarb., 5 gr. to oz.	
See also Vapores.	
Nectandrine, 815; Neelsen's Sol.	Vol. II.
Neem, Nim	814
Neisser's Bacterin, 895; Bougies, 189; Stains	Vol. II.
Neisser-Siebert Ungt... ..	476
Nelli	827
Neo-arsenphenolamine . ..	217
Neokharsivan	217.
Neolyse. Cachets, Injns., Compresses	540
Neon	Vol. II.
Neophenoquin Tabs., 5 to 15 *p.d*	328
Neoprotosil	185
Neo Trepol	254
Neo-Salvarsan	217
Nephritis	1044
,, Interstitial and Parenchymatous, Diffs...	Vol. II.
Nepenthe, 5 to 20 m.	632
Nernst Lamps, Vol. II. Neroli Oil	232
Nesfield's Sterilising Tablets	Vol. II.
Nessler's Solution ..	Vol. II.
Nettle, 39; Neuralgic Pills ..	260
Neuralgic Powders, 16 gr. ..	262
Neurinase, 1 to 4 dr.	793
Neurine	7

NAME. DOSE.	PAGE
Neutral Red, Vol. II.; Egg Medium	907
Neutralisation Table ..	xxxiv
New Skin.	365
Niccolum and Salts ..	Vol. II.
,, Carboynyl ..	Vol. II.
Nicholson's Blue. ..	Vol. II.
Nicolle's Antigono. Serum ..	896
Nicotina, 1/6 to 1 gr., Salicylas	845
Night Blue .. 331 &	Vol. II.
Nightshade, Deadly	235
,, Black, Woody.. ..	859
Nikalgin, 5 to 15 gr.	717
Nikkei Bark	310
Nile Blue	329
Nilicamam, 827; Nim.. ..	814
Ninhydrin	Vol. II.
Nisbet's Specific.	624
Nitre, 701; Nitrated Papers ..	701
Nitrifying Bacteria ..	Vol. II.
Nitrite of Amyl, ½–1 m. by mouth; 2–5 m. inhaled	164
,, Sterules	165
Nitrobenzol .. 323 &	Vol. II.
Nitro-celluloses..	364
Nitro-erythrite, ½ to 1 gr. ..	420
Nitrogen.. .. 637 &	Vol. II.
,, Estn. in Urine ..	Vol. II.
,, Fixation	Vol. II.
,, Peroxide .. 1065 &	Vol. II.
Nitroglycerin, 1–200 to 1–50 gr. incr.	568
,, Assay of	Vol. II.
,, *Solution*, ½–2 m. incr. ..	570
,, *Tablets*, 1–600, 1–400, 1–200, 1–100, 1–75, 1–50 & 1–25 gr., also ½ and 1 mgr. 571 *et seq.* (*See also Tabellæ*).	
Nitro-mannite, 1 gr.	421
Nitrometer	Vol. II.
Nitropropiol	Vol. II.
Nitro-toluene (*o.* & *p.*).. ..	355
Nitrous Oxide, 158, with ether, 114; Nitrous Oxide & Oxygen, 158; Nizin	321
Nordhausen Acid	104
Norit, 5 Gm. 3 or 4 times daily.	817
Normal Horse Serum.. ..	927
,, Saline Solution	742
Normyl Treatment ..	Vol. II.
Notification of Infectious Diseases	976
,, Tuberculosis	914
Novarsenobenzol, 217; Methods of Injection.	218
Patents and T.M.'s	217
Report on Makes	218
Doses	218
Guaiacol-Glucose with ..	218
in dis. other than Syphilis	219, 220
Suppos.	220
Novarsenobillon	217
Novaspirin, 86; Novaspirinoids	86
Novarsenol	217

NAME.	DOSE.	PAGE
Novocain, 1/5 to 1 gr.		353
,, Identification		Vol. II.
,, -Suprarenin		354
,, with Strychnine		354
Nuclein, Nucleol, 15 gr.		293
Nucleo-proteins		Vol. II.
Nutmeg		844
Nutrimenta	575 &	Vol. II.
Nutrient Powder, Brand's		578
Nux Vomica, 1 to 4 gr.	598 &	V.II.
Nyctal, 5 to 15 gr.		793
Nylander's Reagent		Vol. II.
Nyrdahl's Dragees		835
Oak Agaric, 810; Oak Bark		853
Ocymum		846
Oenanthe Crocata		846
Ogle's Drops, 1 dr.		555
Ohm's Law		Vol. II.
Old English Fever Powder		725
Olefiant Gas		305
Oil of Amber		861
Oil Sterilised, 164; *of Lemon Grass*, 847; of Mirbane, 323; Tar		690
See also Oleum.		
Oil of Orange in Anæsthesia		115
,, Vitriol		103
,, *Wintergreen*		79
Oil Ether Anæsthesia		117
Oils, Iodine, Nos. of		Vol. II.
,, Essential, Antiseptic power of	600 &	Vol. II.
,, Saponification Nos.		Vol. II.
Oiled Calico, Silk, etc.		285
Oiled Silk Dextrinised		285
Oiled Silk Protective		285
Oils, Akaloidal		621
Ointment Bases, 788; m.pts.		V.II.
Ointments, *see* Mulls and Unguenta.		
Okol. *See* Sanitas Okol.		
Olea Essentialia	600 &	Vol. II.
,, ,, 'T' & 'S' free		V. II.
Olea europœa		618
Oleanodyne		601
Oleata, 601; Prepn. of	601,	604
Oleatum Aconitinæ, 1 in 50		110
,, *Hydrarg.*, 5 to 25%	602 *et seq.*	
,, ,, c. Morph.		602
,, ,, c. Sulph.		603
,, Morphinæ, 1 in 60		554
,, Veratrinæ, 1 in 50		865
Oleo-Bi		255
Oleogens		658
Oleo-res Aspidii, 30 gr.		434
,, Capsici		286
Oleo-res Copaibæ		623
,, Cubebæ, 5–30 m.		399
,, Piperis, av. ½ gr.		850
Oleosaccari, F. Ital., *q.v.*		
'Oleum'		104
Oleum Abietis		687
,, Acidi Salicylici		81
Oleum Adipis = Lard Oil.		
,, *Ajowan*, ½ to 3 m.		782
,, Allii Essent., ½–1 m.		809
,, *Amygd.*, 163; Sterilisat.		164
,, ,, Ess. (et *s.* HCN)		163
,, ,, Persicæ		163
,, *Anethi*, ½ to 3 m.		812
,, *Anisi*, ½ to 3 m.		812
,, Anseris	562,	788
,, *Anthemidis*, ½–3 m.		812
,, Apii, ½ to 3 m.		182
,, *Arachis*		812
,, Aseptic		164
,, Atropinæ		229
,, Aurantii, 232; with Ether		115
,, ,, Terpeneless		232
,, Bergamot		Vol. II.
,, *Betulæ*, 5 to 15 m., 79; Pyrolig.		691
,, *Cadinum*		690
,, ,, Acetic		690
,, *Cajuputi*, ½–3m.		817
,, Camphoræ Essent.		276
,, Camphorat.		277
,, Cantharidatum		283
,, Carbolicum		19
,, *Carui*, ½ to 3 m.		819
,, *Caryoph.*, ½–3 m.		819
,, Cassiæ, ½–3 m.		310
,, Cedri var.		820
,, Celery, ½ to 3 m.		182
,, *Chaulmoogræ*, 5–10 m. incr.		606
,, Chenopodii, 3 m.	525,	822
,, Cinereum		460
,, *Cinnamomi*, ½ to 3 m.	310 &	Vol. II.
,, Citri		Vol. II.
,, Citron		Vol. II.
,, Citronellæ		Vol. II.
,, c. Cocaina, 2%		341
,, Cocois Nucif	102,	788
,, Colza		738
,, *Copaibæ*, 5 to 20 m.		623
,, *Coriandri*, ½–3 m.		824
,, *Crotonis*, ½ to 1 m.		846
,, ,, Comp.		847
,, Croton Elliott, 1 to 3 m.		847
,, ,, Caps., ½ m., two to 5		847
,, *Cubebæ*, 5 to 20 m.		399
,, Cupressi		826
,, Dugong		618
,, "Elliott," 1 to 3 m.		847
,, Erigeron, 5 to 30 m.		828
,, Eserinæ		621
,, *Eucalypt.*, ½–3 m.		613
,, Fagi Pyrolig.		691
,, Fœniculi, 5–15 m.		829
,, *Gaultheriæ*, 5 to 15 m.		79
,, Gossyp. Sem.		277
,, *Graminis Cit.*		847
,, Gynocardiæ, 5 to 60 m.		606
,, Hedeomæ		851
,, Helianth.		619

NAME.	DOSE.	PAGE
Oleum Homatropinæ	.. ..	231
,, ,, c. Cocaina	.. ..	231
,, Hydnocarpæ	.. ..	606
,, Hyd. Biniodidi, 1 Cc.	..	468
,, Hyoscinæ..	..	489, 621
,, Iodoformi et Creosoti	..	498
,, Jecoris	.. .. ..	615
,, ,, c. Iodo	.. ..	617
,, *Juniperi*, ½ to 3 m.	..	837
,, ,, "Ligni," 837; Pyrolig.	.. ..	690
,, Lauri	.. .. ..	839
,, *Lavand.*, ½ to 3 m.		Vol. II.
,, *Limonis*. ½ to 3 m.		Vol. II.
,, *Lini.*, 840; Lubricans	..	19
,, Maidis	.. .. ..	619
,, Majorani	.. .. ..	848
,, Mastiche	.. .. ..	842
,, *Menthæ Piperitæ*, ½ to 3 m.	.. .. ..	842
,, ,, *Viridis*, ½–3 m.	..	842
,, *Morrhuæ*, 1 to 4 dr.	..	615
,, ,, Vitamin 'A' in 591 *et seq.*		
,, ,, Aromat., 1 to 4 dr...		617
,, ,, c. Creosot, 1 to 4 dr.		394
,, Myrciæ	.. .. ..	127
,, *Myristicæ*, ½–3 m.	..	844
,, Myrti, 844; Neatsfoot		Vol. II.
,, Neroli .. 232 &		Vol. II.
,, Nitroglycerini, 1%, 1 to 2 m.	.. .. ..	571
,, Nucis Arachis	.. ..	812
,, ,, Moschatæ	.. ..	844
,, *Olivæ* (sterilised, 164, 619), ¼ to 1 oz...	..	619
,, Origani	.. .. ..	848
,, Palmæ	.. .. ..	788
,, Papaveris, ¼ to ½ oz., or *ad lib.*	.. ..	619
,, ,, Pulv., 1 to 3 dr.	..	620
,, Patchouli..	.. ..	848
,, Petitgrain .	..	Vol. II.
,, Persic	.. .. ..	163
,, Petrolei (& Flav., 653)..		653
,, Petroselini	.. ..	181
,, *Phosphorat.*, 1 to 5 m.	..	676
,, Picis Rect.	.. ..	690
,, Pilocarpinæ	.. ..	621
,, Pimentæ, ½ to 3 m.	..	849
,, Pini Pumil.	.. ..	687
,, *Pini Siberic*	.. ..	782
,, Ptychotis, 1 to 3 m.	..	743
,, Pulegii	.. .. ..	851
,, Resinæ Empyr.	.. ..	853
,, Rhodii	.. .. ..	847
,, *Ricini*, 1 to 8 dr...	.. ..	620
,, ,, Aromat., 1 to 8 dr..		621
,, *Rosæ* .. 847 &		Vol. II.
,, *Rosmarini*, ½ to 3 m.		Vol. II.
,, Rusci Pyrolig.	.. ..	691
,, Sabinæ, 1 to 4 m.	..	855
,, *Santali*, 5 to 30 m.	..	622
,, Sassafras	.. .. ..	856
,, *Sesami*	.. .. ..	625
,, Sinapis Ex. *& Volatile*,		738, 739

NAME.	DOSE.	PAGE
Oleum Soya	.. ..	619, 860
,, Staphisagriæ	.. ..	861
,, Succini, 1 to 5 m.	..	861
,, *Terebinthinæ Rect.*, 2 to 10 m. as Anthelmintic, 3 to 4 dr.	.. ..	685
,, *Theobromatis* 102, 778 &		V. II.
,, Thymi, 3 m.	..	782, 864
,, Tiglii, 1 m.	.. ..	846
,, Valerianæ, 1 to 5 m.	..	797
,, Veratrinæ	.. ..	865
,, Verbenæ Indic.	.. ..	847
,, Wintergreen	.. ..	79
Olio di Fegato Merluzzo	..	615
,, ,, ,, Iodato	..	617
Oliveri Cortex	.. .. ..	856
Omam (Ajowan).	.. ..	782
Omnevit, ½ dr...	.. ..	598
Omnopon, ⅛ to ⅓ gr.	.. ..	632
Omnopon-Atrinal	.. ..	633
Omnopon & Scopolamine	..	633
Onguent Napolitaine	.. ..	462
,, Peuplier	.. .. ..	239
Ononis	.. ..	847
Operation Gloves	.. ..	285
Ophthalmic Bottle	.. ..	228
,, Lamels, *see* Lamels.		
,, Solvent (Harman)	..	231
Opoidine, ⅛ gr. *per os*..	..	633
Opium, ½ to 2 gr. 625 &		Vol. II.
,, Thebaicum=Opium Fr. Codex.		
Opium Convention	.. ..	340
,, Raw	.. .. ..	625
,, Abuse of	.. .. ..	627
,, Smoking	.. .. ..	628
,, Granulatum	.. ..	631
,, Restrictions as Dangerous Drug 983 *et seq.*		
Opsonins, Opsonic Index	..	869
Optochin HCl., 3 to 4 gr.	..	400
Optophone	.. .. ..	774
Orange Juice, intrav. use	..	597
Optochin *Base*, 3 to 4 gr.	..	400
Orange Oil	.. .. ..	325
Orcein and Orcin	..	Vol. II.
Orchic Fluid	.. .. ..	965
Orchidin, 965; Orchil...		Vol. II.
Orchis Mascula..	.. ..	855
Ordeal Bark, 422; Beans	..	680
Orders in Council	.. ..	
'Orders,' 'Signed,' *see* 992 *et seq.* & 1001.		
Organosols	.. .. ..	389
Organic Analysis Chart		Vol. II.
Organotherapy .. 944 &		Vol. II.
Orge	.. ..	497
Organotropic Substances	..	205
Oriental Sore	.. ..	Vol. II.
Origanum Sp., 847; Orizabin, 1 to 5 gr.	.. .. ..	836
Oro-nasal Inhalations	..	395, 549
Orphol	.. ..	250
Orpiment	.. .. ..	203
Orris Root	.. .. ..	836

NAME.	DOSE.	PAGE
Orseille		Vol. II.
Orthocresol		34
Orthoform, 1½–3 gr., HCl.		352
Orthosiphon		848
Orthotoluidine, 321; Ortol		Vol. II.
Osacol Jelly		655
Oscol Colloids		386
Oscol Stibium and others		376, 386
Osmium Tetroxid., 1/64 gr.		805
Osmo-Kaolin 1 dr. or more		155
Osmotic Pressure		Vol. II.
Osseine		435
Otto of Rose		847
Ouabain, 764, 806; Ourari		825
Ovaltine		Vol. II.
Ovamammoid Capsules		949
Ovarian Gland		948
Oviol		617
Ovo-lecithin, Elixir, Emulsion, Inj., Pills, Powder, Tabs., etc.		534 *et seq.*
Ovules, *see* List		633, 634
,, Cupri Oleat		602
,, Masses, 634; Tropical		634
Owbridge's Lung Tonic		Vol. II.
Ox Bile, 5 to 15 gr.		423
Oxycroceum Plaster		821
Oxygen, 634; Cylinders, Inhaln. App., 635; 'Solid,' 488; Water		15
Oxygen and Alcohol Inhaln., 636; Ether		114
,, Injections		635
,, Mask		636
Oxyhæmoglobin		578
Oxylith		488, 634
Oxymel Scillæ, ½ to 1 dr.		—
,, *Urgineæ*, ½–1 dr.		864
Oxymethylene		139
Oxyntin 5 to 15 gr.		50
Oxy-Quinoline Sulphate		327
Oxyquinotheine Cachets		266
Oxysparteina (HCl. and Sulph.) ½ to 1½ gr.		758
Ozæna Vaccine, 50 to 1,000 mill		902
Ozokerit		651
Ozone		635
Ozonic Ether, ¼ to 1 dr., 487; ,, Inhalers		549, 550
P1 & P		978
Paeonia		848
Paarde-Pram		867
Pacolol		38
'Packets' Preventive		V. II.
Pagenstecher's Ointment		481
Pagliari's Soln.		152
Paints, Luminous		Vol. II.
Palladium Chloride		Vol. II.
,, Colloid		372, 383
Pallamine		383
Palmetto 856; Palmitin		460
Palmyra Fibre		536
Panama Bark		853
Pancreas		637
Pancreatic Diastase		637
,, Solution, 1–2 dr.		639

NAME.	DOSE.	PAGE
Pancreatinum, 2 to 4 gr.		638
,, Incompatibility Expts,		639 & V. II.
,, and Bismuth, 1 to 2 dr.		243
Pané and Renzi's Serum		905
Panitrin		560
Pansy, 10 to 60 gr.		866
Panopeptone		662 & V. II.
Pantopon, ⅛ to ⅓ gr.		632
Papain, 1 to 8 gr.		435, 650
Papaver Somniferum		625
Papav. Capsulæ		626
Papaverine		560 & V. II.
,, Periodid ½ gr.		148, 560
,, Sulphate, ½ to 1¾ gr.		560
Papayotin, 1 to 8 gr.		650
Papaw Fruit and Juice		650
Papine, 1 dr.		630
Para-acet.-phenetidin, 5 to 15 gr.		332
Para-amido-Ethyl-Benzoate		355
Para-amino-benzoyldiethyl-amino-ethanol, HCl.		353
Para-Amidophenol		Vol. II.
Paracarmine		Vol. II.
Paracresol		33, 34
Para Dichlor Benzene		323
Paraffagar, 1 to 2 dr.		656
Paradimethylamidobenzaldehyde		Vol. II.
Paraffinum Comp. Liq.		656
Paraffin. Dur. (& Sterilised)		651
,, Brominated		510
,, Ctd. Starch Tabs.		69
,, Iodine in		510
,, "No. 7"		652
,, Treatment of Burns		652
,, *Liq.* (Sterilised, 164, 656)		653
,, Amer and Russ		62, 654
,, Viscosity of		653
,, Chlorinated		62
,, with Acriflavine		317
Paraffin Molle		651
Paraform, 139; Collodion		140
Paraform Snuff		140
Paraguay Tea		266
Paraldehydum, 30 to 120 m.		133
,, Caps., 20, 30, 40 m.		133
,, as Anæsthetic		134
Para-monochlor-phenol		24
Paranephrin		960
Paraphenylenediamine		320
Parasites to Kill		1047
Parasitotropic Compds.		205
Parathyroid Gland Desicc. 1/60 to 1½ gr.		973
,, Tablets		973
,, Refs. ttment		973, 974
,, Standardisation and Calcium		974
,, Toluene Sodium Sulphone Chloramide		60
,, ,, Sulphone Chloride		60
Parasitotropic Substances		517 & Vol. II.

NAME.	DOSE.	PAGE
Paratyphoid Vaccines, 930; Bacillus		Vol. II.
Paregoric (Scotch, 632), ½ to 1 dr.		630
Pareira, av., 30 gr.		848
Paremetol 1 to 2 dr.		526
Paroleine		653
Parotid Gland		949
Parrish's Ch. Food, ½ 2-dr.		430
Parsley, Garden, 181; Fools, 807; Parsley Piert, 808; Wild		823
Pas de Calais Work on Typh. Vaccines, *per os*		872, 934
Passiflora		848
Pasque Flower		851
Pasta Acid. Salicyl.		81
,, Arsenicalis (& Arsenios)		194
,, Bismuthi Beck		246
,, Bismuth et Iodof.		246
,, Carbonis et Zinci		801
,, Coll. Argent		386
,, Flava-		482
,, Formalini		139
,, Hydrargyri Cyanidi		465
,, Hyd-Oxycy.		466
,, Ichthyol et Ol. Tereb.		495
,, Iodi et Amyli		511
,, ,, et Picis		505
,, Iodoformi Cinnam.		499
,, Lassar's		801
,, Mackintosh		738
,, Moorhofi		500
,, Londinensis		695
,, Plumbi c. Cupro.		693
,, Resorcini, Fort. Mitis, et c. Zinci Oxido		731
,, Theobromatis		778
,, Unna		801
,, Zinci c. Amylo		801
,, ,, Composita		801
,, ,, et Gelatini		801
Pasteurisers		582
Pasteurisation of Milk		582
Pastilles, Asthmatic		701
,, Guimauve		442
,, or Jujubes *v.* Trochisci		
,, Réglisse		832
Pastilli, Glyco-gelatin		442
,, Acid Boric		12, 442
,, Acidi Carbolici, ½ gr.		21
,, Aconiti, 1 m.		109
,, Ammon. Brom., 1 gr.		157
,, Bismuth Carb., 3 gr. c.		
,, Morph. Acet., 1/40 gr.		241
,, Cascara		290
,, Cocæ Ext., 2½ gr.		338
,, Cocainæ HCl. $\frac{1}{50}$ gr. c. Antipyrin, 3 gr.		345
,, Cocainæ HCl., 1/10 gr.		
,, (et c. Morphina), 345; Sugar		346, 554
,, Codeinæ, ⅛ gr.		360
,, Convallariæ		824
,, Emet. Oleate ¼ gr.		526
Pastilli Emet Oleate Co.		526
,, Formosyl		138
,, Marsh Mallow		442
,, Menthol, ⅛ gr.		550
,, Morphinæ, 1/30 gr.		554
,, Pyrethri		852
,, Ravaut's Paste		528
,, Stamachici		831
,, Stovaine 1/20 gr.		359
,, Tamarind Co.		863
,, Terebini		777
,, Terpheroin Co.		687
,, Thymol, 1/32 gr.		784
,, Ulmus Fulv.		864
Patchouli		848
Pates Pectorales		842
"Patent" Medicines		Vol. II.
"Patent" Mixture		118
Patents and Trade Marks		1003 *et seq.*
Patents, Conference on Empire		1004
Patents, Designs and Trade Marks (Temp. Rules) Act		1003
Patents and Designs Act (1919)		1004
Patent Blue		331
Pathone		38
Paullinia Sorbilis		832
Pautauberge's Sol., ½ oz.		394
Pavimol, ½ to 1 oz. incr.		620
,, Capsules, 2 to 4, *t.d.*		620
,, Powder, 1 to 2 dr. incr.		620
,, with Malt, ½ to 1 oz. incr.		620
,, Tablets, 5 m. 4 to 8		620
Peaflour Extract		Vol. II.
Pea Nut Oil		812
Pear Essence		Vol. II.
Pearl Disease = Tuberculosis of Serous Membranes of Cattle, *see* Tuberculins Bovine.		
Pearson's As. Solution		197
Peenash		479
Pellagra		Vol. II.
Pellanthum and Comps.		801
Pelletierina, 2 to 6 gr.		658
Pelletierinæ HBr. Sulph., *Tannas* (2 to 8 gr.), etc		435, 659
Pellitory		852
Pelosine		815
Pennyroyal		851
Penta-vaccine		931
Pentasulfure d'Antimoine		170
Pentosuria V. II.; Pentyl Hydride		658
Peony		848
Pepo, av. 1 oz.		848
Pepper		850
Peps. V. II.; Pepsalia		745
Peppermint		842
Pepsoden t		274
Pepsin, 5 to 10 gr.		659 *et seq.* & V. II.
Peptone, 661; Water, etc.		Vol. II.
Peptone Immunisation in Asthma		665
,, Indications & contra-indications		665
,, Technique		666

NAME. DOSE. PAGE

Peptone Sterules, Intrav. .. 666
" " " cont. course 666
" " Intram. .. 666
" " " cont. course 666
" " 10% 10 Cc. in septicæmia 669
" Witte 667, 670
" in Epilepsy 668
" in Vaccine Therapy .. 669
" *Per os.* (0.5 Gm. *t.d.a.c.*) 669, 671
" Nolf's Method .. 669
" Danysz " 669
Patient's blood mixed with, and injected after incubation,—Auld, B.M.J.ii 24,575.
Peptonised Beef, 640; Beef Essence, 576; Beef Jelly, 640; Beef Suppos., 662; Chicken Jelly, 640; and Malt 662; Milk 640
Peptonising Powders 640
Peptonoids of Beef .. 662 & V. II.
Perborates, 14; Perborol .. 15
Percentage Table .. XXXIV.
Perchloride, *see* Hyd., also Solubes.
Perchlorethylene 306
Perfumed Formosyls .. 600
Periwinkle 866
Perfumes, Synthetic .. Vol. II.
Periodic Table of Elements Vol. II.
Periodides, Alkaloidal .. 146
Perles Apiol, 3 m., 1 or 2 .. 181
" Camph. Monobr. 2 gr. .. 279
" Carbolic Ac., 1, 2, gr. .. 21
" Chloroform, 3 m. .. 304
" Creosote, 1, 3 m. .. 394
" Ether, 2 m., 1 to 4 .. 118
" " 2 m., c. Tereb., 3 m.
" Guaiacol, 1, 2, 3 m. .. 397
" Izal, 2 m. (Caps.), et c. Ol. Morrh., 5 m. .. 37
" Phosphorated Oil, 1/100, 1/65 & 1/32 gr., 1 or 2 676
" Quin. Sulph., 1½ gr. .. 724
" Tar, 2½ gr. 689
Perlsucht. *See* Tuberculin P.T.
Permanganate. *See* Pot. Permang.
Permits in Dangerous Drugs .. 984
Peroxide of Hydrogen .. 485
" Mouthwashes .. 486
Persio, V. II.; Persulphates .. 753
Peru Balsam, 5 to 15 m. .. 814
Pertussin, 1 to 4 dr. 864
Pertussis 937, 1061
Perugen 815
Pessaries, Mass for 442
" Hollow, 442; (*q.v.*, for List); Rubber .. 285
" with Cacao Butter, 15, 20 (*flat* shape), 30, 60 or 120 gr.:—
Pessus Acidi Borici, 10 gr. .. 13

NAME. DOSE. PAGE

Pessus Acidi Tannici, 10 gr. .. 106
" {Acid Tannic. 10 gr. / Morphine, 1 gr}
" Atropinæ, 1/20 gr. .. 229
" Bellad. Ext. 1½ gr. .. 238
" Bismuth Oxychlor., 10 gr. 245
" Boroglyceridi, 70 gr. .. 12
" Chloral Hydrate, 10 gr.
" Cocainæ, ½ gr. 345
" Coninæ, ½ m. 391
" Formosyl 138
" Glycerin 442
" Ichthyol 495
" Morphinæ, ½, 1 gr., et c. Bellad. Ext., 2 gr.
" Opii Pulv., 2 and 3 gr.
" Plumbi Iodidi, 5 gr. (et. c. Atropina, 1/20 gr.).
" Potassii Bromidi, 10 gr.
" Quin. HCl., 3 to 5 gr. .. 712
" Zinci Ox., 10, 15 gr.
" Zinci Sulphocarb., 5 and 10 gr. .... ..
Petechial Fever 885
Petit's Liquor 412, 441
Petrogell, Petrojel 655
Petrol, 657 & V. II.; Poisoning 657, 1066; Petrolatum, U.S., 653; Iodi, 503; Liq. .. 653
Petroleinum 658
Petroleum, 657; Benzine, 322, 657; Cerate, 652; Emulsion 1 to 4 dr., 654; Ether, 657; Insecticide, 651; Jelly 651; *Spirit* 657
Pétrole léger 658
Petroselinum Sativum .. 181
Pettey Method 629
Petty Spurge 829
Peucedanum 812
Peumus Boldus 816
Pexuloid 366
Pfannenstiel's Method .. 502
Pharaoh's Serpents 483
Pharbitis 837
Pharmacist's Qualification .. 977
Pharmacy Act, Poisons Schedule 977, 978
Phaseolus 848
Phenacetinum, 5 to 15 gr. .. 332 & Vol. II.
" c. Caffein, Eff. 1–2 dr. 333
Phenalgin, 5 to 20 gr. 4
Phenazine Compds. 315
Phenazonum, 5 to 15 gr. .. 333 & V. II.
" Eff., 5, 10, 15 gr. in dr. 334
" Salicyl. 336
Phenetidin 332
Phenocain 351
Phenocoll HCl., 8 to 15 gr. .. 333
Phenol, 1 to 3 gr. 16
" Bismuth. 10 to 30 gr. .. 250
" Camphorat. 18

NAME.	DOSE.	PAGE
Phenol.	Iodized, 20; Lotion ..	18
,,	Mercury, ½ to 2 gr. ..	464
,,	*Phthaleinum*, 2 to 5 gr.	672 & Vol. II.
,,	Tablets..	673
,,	,, Valerianate ..	673
,,	Phthalin ..	Vol. II.
,,	Red	673
,,	Sod.-Sulphoricinas ..	621
,,	Sodique	20
,,	Sulphonephthalein, 6 mgr.	673 & Vol. II.
,,	,, For Typhoid B...	Vol. II.
Phenolaine	.. .. ..	359
Phenolax, ½ to 8 gr.	..	672, 673
Phenoloids	.. ..	34, 979
Phenoloid Disinfectant	..	38
,,	Tablets..	38
Phenoquin, 30 to 45 gr. daily		327
,,	Tablets, 4 gr., 8 to 12 daily, *p.c.*	328
,,	,, 8 gr., 4 to 6 daily, *p.c.* ..	328
Phenosalyl	.. .. ..	24
Phenyl-acetamide, 2 to 5 gr.	..	3
Phenyl-acetyl-Salicyl, 15 gr.	..	96
,,	amine	320
,,	Aspirin	96
,,	Aspriodine 5 gr. ..	100
,,	-carbonate	789
,,	-dimethyl-iso-pyrazolone, 5 to 15 gr. ..	333
,,	hydrate, 1 to 3 gr. ..	16
,,	propyl-Acetas . ..	861
,,	,, Alcohol	861
,,	-hydrazine ..	Vol. II. 4
,,	*Salicyl*, 5 to 15 gr. ..	94
,,	Sedasprin, 5 gr.	100
Phenylene-diamine, Meta, 321;	*Para*	320
Phlogetan	.. .. ..	294
Phloridzin	.. .. 848 &	V. II.
Phloroglucin	.. ..	Vol. II.
Phosgene	 789,	1066
Phosphates, Sacchar. Wheat	..	679
Phosphatia	.. ..	Vol. II.
Phosphatides	.. .. ..	616
Phosphorated Cod L. Oil, 1 to 2 dr.	.. ..	676
,,	*Oil*, 1 to 5 m.	676
,,	*Suet*, 1 in 10	676
Phosphorus, 1/100 to 1/20 gr.		675
,,	Pentachloride	677
,,	Perles, 1/65 & 1/32 gr. ..	676
,,	Pills 676	*et seq.*
Photoxylin	.. .. ..	365
Photographic Developer, V. II.;	Sensitisers	327
Phylacogens	. .. ..	943
Phylosan..	.. .. ..	823
Physiological Salt Solution	..	742
,,	Standardisation ..	Vol. II.
Physostigma Sem., 1 to 4 gr.	..	680
Physostigmina, 1/100 to 1/50 gr.		681

NAME.	DOSE.	PAGE
Physostigmina Salicyl, 681;	*Sulph.*, 1/60 to 1/20 gr. ..	681
Phytin, Tabs. 4 gr. and Granules		680
Phytolaccin, 1 to 5 gr. ..	.. ..	849
Pichi	.. ..	849
Picric Acid Wool, Gauze	..	75
,,	,, Solution (Esbach's)	V. II.
,,	,, Brass Paste ..	403
Picrocarmine	.. ..	Vol. II.
Picrasmin	.. .. ..	852
Picrorrhiza, 10 to 60 gr.	..	849
Picrotoxinum, 1/100 to 1/25 gr.		849
Pigment Acidi Picrici et Camph.		75
,,	,, Tannici	441
,,	Antiseptic	20
,,	Argent Nit. Æther ..	187
,,	Camphoræ Chloral et Menthol	278
,,	Casein	586
,,	Chloral Camph. et Co. ..	296
,,	Chrysarobini, et c. Pyrogallol	307, 308
,,	Cocainæ et Hydrarg. ..	348
,,	contra Tineam	475
,,	Eucalpyt. Olei et. Ac. Sal.	615
,,	Ferri Perchlor	426
,,	Guaiacol	397
,,	Iodi, 505; et Aconiti	505
,,	,, et Olei Picis ..	505
,,	,, Æthereale ..	505
,,	,, Carbol.	20
,,	Iodoformi, *v* .Collod ..	
,,	Iodolysin	741
,,	Ipecacuanhæ et Arsenici	519
,,	Li]. Arsen	519
,,	Lœffler	426
,,	Mandl	505
,,	Menthol	550
,,	,, c. Guaiacol . ..	551
,,	Thymol	784
Pilene, Imperm. Spongio	448,	449
Pilewort and Suppos. .	..	852
Pilocarpina	.. .. ..	531
Pilocarpinæ HCl., 1/20 to ⅓ gr.		532
,,	*Nitras*, 1/20 to ⅕ gr. ..	533
,,	Phenas	535
,,	Salicyl., 1/20 to ½ gr. ..	535
Pilocarpine Hair Lotion	533,	731
Pilocarpus Jaborandi ..	531 &	V. II
PILULÆ	.. .. ..	682
Excipients, 682; Gelatin-ctg. 682; Keratin, 683; Pearl Sugar-ctg., 683, 684; Salol-ctg., 95, 683; Stearette Coating, 683; Varnishing		682
Ac. arsenios, 1/50 gr. ..		
Quin. Sulph., 1 gr.		
Strych. Sulph., 1/64 gr. ..		
Phosphori., 1/50 gr. ..		
Acidi Arsen., 1/120 to 1/20 gr.		197
Ac. Arsen. et Ferri Redact. ..		198
Acidi Carbolici, 2 gr. ..		2
Aconiti Tinct. = 2 m., 1 hourly		109
Aconitinæ, 1/600 to 1/200 gr.		110

NAME.	DOSE.	PAGE
Pilulæ :—		
Addison's	.. .. ..	410
Aloes—4 to 8 gr.	.. ..	
,, Cascara et Hyos.	..	149
,, *et Asafetidæ*, 4 to 8 gr.		
,, *et Ferri*, 4 to 8 gr.	..	149
,, Nuc. Vom. et Bellad	..	150
Aloin, 1/10 and 1 gr.	..	
,, Co., 1 *a. cib. ult.*	..	151
,, Strych. et Bellad.	..	151
Aloin, ⅛ gr.; Podoph., ⅛ gr., Ext. Cascara, 1 gr., Ext. Bellad., ⅓ gr., Oleores, Capsici, ⅛ gr.	.. ..	
Alterativa S.H. :—		
{Pil. Hyd., 2 gr. .. / Pil. Rhei. Co., 3 gr. ..}		
Aluminii Chloridi, 2 gr.	..	153
Antidipsom :—	..	
{Strychnine, 1/60 gr. .. / Atropine, 1/200 gr. .. / Quin. Sulph., 2 gr. ..}		
Antimonii Conii et Quin.	..	178
Aperiens = Hyd. Col. Ipec. et Hyos, "78" U.C.H.	..	
Argent. Cyanidi, 1/60 gr.	..	185
,, Nit., 185; et c. Morph., ⅛ gr.	.. ..	187
Arsamin, ½ gr..	.. ..	202
Arsenicalis, 1/120 to 1/20 gr.		191
,, et Strych., 1/50 gr.	..	193
Arsen. Hyd. Iodid.	.. 195,	468
Arsen. Ferri et Hyd. Iod., 1 or 2	.. .. ..	468
Asafedid. Co., 4 to 8 gr.	..	
Asiaticæ, 1 or 2 daily	..	193
Atropinæ, 1/120 to 1/60 gr., 1 *h.s.*	.. ..	229
,, Arsen., et Quin.	..	229
Baillie..	.. .. ..	410
Belladonnæ, Nucis Vom. et Cannabis Ext., ½ gr. each		238
Beta-Naphthol, 3, 5 gr.	.	564
Bismutho-Sodii Sal. cum Salol		248
Blaud's Ferrug, 5 to 15 gr.	..	424
Butyl Chloral, 3 gr.	..	260
{,, Hydr., 3 gr. .. / Gelseminine HCl., 1/200gr.}		260
Butyl Chloral 2 gr., Camph. 1 gr., Ext. Gelsem, ¼ gr.	..	261
Caffeinæ, 1 to 5 gr.	.. ..	262
Caffeinæ Triodidi Comp., *s.t.d.*	.. .. ..	265
Calcii Chloridi, 5 gr.	.. ..	267
,, Permang., ¼ to 2 gr.	548,	744
Calc. Sulph., 1/12 to 1 gr.	..	275
Camphoræ	.. .. ..	278
,, Monobrom., 3 gr.	..	279
,, Salicyl., 1 to 5 gr.	..	279
Capsici Co.	.. .. ..	286
Cascara Ext., 2 gr.	.. ..	
,, Co., 1 *h.s.*	.. ..	209

NAME.	DOSE.	PAGE
Pilulæ :—		
Cathartic Co., U.S.:— Ext. Col. Co., 2½ gr.; Gamboge, ½ gr.; Hyd. Subchlor., 2 gr.; Jalap Res., ¾ gr., approx. in 2 pills for av. dose.		
Cereviseæ Ferment *vide* Fæxin.		
Champney, *Syn.* Pil. Hydrarg. Perchlor. Co. Barts. Mercuric Chloride 1/32 gr., Aloes Extract, Nux Vomica Extract, Belladona Extract ¼ grain each. Used in salpingitis.—Langford Moore, P.J.i/20, 39	.. ..	
Chlorure Mercurique Opiacées		475
Cocainæ HCl., 1/5 gr.	..	345
Codeinæ Co., ¼ to 2 gr.	..	360
(*Mucilage as Excipient not Syrup.*)		
Codeinæ Valerainæ Co.	..	361
Colchicinæ, Hyosc. et Nuc. Vom.	.. .. ..	363
Colocynth. Co., 4 to 8 gr.	..	390
,, *et Hyos.*, 4 to 8 gr.	..	390
,, c. Ipecac. Aperient, = U.C.H., '78'; Pil. Col. Co., 2 gr. Pil. Hyd. 1½ gr.	.. ..	
Compound Bismuth	. ..	248
Coninæ HBr., ⅛ gr.	. ..	390
Convallariæ Ext., 2 to 8 gr.		824
Creosoti, 1 in 2, 2-6 gr.	..	394
Crocq., 187; Cupri Acet., ⅛ gr.		401
Damianæ Co., 1 *t.d.*	. ..	827
Digitalis Fol., ½ gr., 1 *t.d.*		
,, Opii et Quin. (Heim's) :— Digitalis, ½ gr., Ipecac., ¼ gr.; Opii, ¼ gr.; Quin. Sulph., 1 gr.		
,, Co., St. G.H.	.. ..	410
Digitoxin, 1/250 gr.	..	410
Diureticæ S.H. :— {Pil. Hydrarg. Pulv. / Scillæ Pulv. Digital.} *a.a.* 1 gr.		
Donovani	 195,	468
Dupuytren	.. .. ..	475
Easton's (et. c. Arsen., 1/60 gr.), 2 or 3 daily	.. ..	432
Elaterii Co.	.. .. ..	827
Emetine Bism. Iodide, 1, 2 and 3 gr., *Salol. ctd.*	..	522
Ergotini, 1, 2 or 3 gr.	..	417
Ergotin, gr. 3; Strychnine Sulph., gr. 1/64; Ext. Cannab. Ind., gr. ⅛ (Owen Lankester).		
Euonymin, 2 gr.	.. ..	423
Euonymi Co., Bart's. :— Ext. Euonymi, 1 gr.; Ext. Aloes, 1½ gr.; Ipecac., ½ gr.; Ext. Hyoscy 1 gr.		
Exalgin, ½ to 2 gr.	.. ..	4
Ext. Bellad., ⅛ gr., ⅓ gr., ¼ gr.		

NAME.	DOSE.	PAGE
Pilulæ :—		
Ext. Filicis, 3 m.		435
Ext. Hyoscy., 1 gr., Ipecac., ⅓ gr.		
Ext. Nucis V., ¼ gr., ⅓ gr., ½ gr., Salol, 2 or 3 gr. (Mayo Robson).		
Extr. Cannab Ind., ¼ to 1 gr.		281
Fæxin Ext., 3 gr.		293
Ferri Arsen. (et c. Strych. HCl., gr. 1/60)		193
,, (*Blaud*), Carb. 5 to 15 gr.		424
,, Carb. Sacch., 4 gr.		424
,, Glyceroph., 1 *c.cib.*		
,, Hypoph. c. Strych., 2 or 3 *p.d.*		678
,, Iodidi 3 to 8 gr.		430
,, Iod. et Sod Arsen		430
,, Quin. et Strych. Phosph. (et c. Arsen.)		432
,, Sulph. Exs., 3, 5 gr.		433
,, Redact, 1, 2 gr.		424
Ferri Redacti, 1 gr., Ext. Nux. Vom., ¼ or ½ gr.		
Ferri Sulph., 1 gr., c. Strych., 1/30 gr.		
Filicis Ext., 3 m.		435
Galbani Co. (B.P. '98), 4 to 8 gr.		
Garrodii		430
Gossypii Co., 3 or 4 daily		452
Glycerophosphatum, 4 gr.		43
Gout— Pil. Hydrarg. gr., 1; Ext. Colchici, gr., ¼; Pil. Col. c. Hyos. gr. 1½.		
Gregory = Col. Co.		390
Guaiacol, 1 to 3 gr.		397
Guy's		410
Hamilton		390
Hutchinson, N.H.W. = Hyd. c. Cret., Pulv. Ipec. Co., *a.a.* gr. 1.		
Hydrargyri, 4 to 8 gr.		461
Hyd. et Digital. Co.		410
Pil. Hyd., 2½ gr. / Pil. Coloc. Co., 2½ gr.		
Pil. Hyd., 2½ gr. / Pil. Rhei Co., 2½ gr.		
Pil. Hyd., 1 gr. / Pil. Col. c. Hyos., 4 gr.		'Third night.'
Pil. Hyd., 1½ gr. / Ext. Col. Co., 2 gr. / Ipecac., ½ gr. / Ext. Hyos., 1 gr.		
Pil. Hyd., 3 gr. / Opii Pulv., ¼ gr.		
Hyd. c. Creta, ⅓, ½ gr.		
Hyd. c. Creta, 1, 2, ⅓ gr. / P. Ipec. Co., 1, 2, 3 gr.		
Hyd. Cyanidi 1/10 gr.		465
Hyd. Iod. Flavi, ⅛ gr.		470
Hyd. Iod. Rub., 1/50 to ⅛ gr.		467
Hyd. Iod. Rub., ⅛ gr., et Pot. Iod., 4 gr.		470
Hyd. Iod., Vir. ⅛ to ½ gr.		470

NAME.	DOSE.	PAGE
Pilulæ :—		
Hyd. Iod. Vir., B.S.H.—Hyd. Iod. ½ gr., Opium ¼ gr., Ext. Gent., 2 gr.		
Hyd. Perchlor., 1/40 to 1/12 gr.		475
,, ,, Co. *see* Pil. Champney		
Hyd. Subchlor., ½ to 3 gr.		
Hyd. Subchlor. Co., 4 to 8 gr.		
Hyd. Subchlor., 2 gr. / Coloc. Pil., 2 gr. / Pil. Rhei Co., 2 gr. (Army Pill No. 9.)		
Hyd. Subchlor., 1, 2 gr. / Pil. Col. c. Hyos., 3, 4 gr.		
Hyd. Subchlor., 1, 2 gr. / Opii Pulv., ½ gr., 1 gr.		
Hyd. Subchlor., Rhei, Cascara et Capsic.		480
Hyd. Tannat., 1 to 4 gr.		481
Hydrastin, ⅜ & 1 gr., 1 *p.d.*		484
Hyoscinæ HBr., 1/400 to 1/150 gr.		490
Hyoscyaminæ, 1/200 gr. incr.		493
Ichthyol Ammon., 2½ gr. Lith. & Soda (of either 1½ gr.), 4 to 12 daily		495
Iodoformi, ½ to 3 gr.		
Ipec. c. Scilla, 4 to 8 gr.		
Ipecac. c. Urginea, 4 to 8 gr.		864
Ipecac. (Salol ctd.)		514
Iridin 2 gr. 1 *h.s.*		836
Laxativæ Co.		157
Lecithin, 1½ gr.		534
,, c. Ferri. Iodid.		535
Lithii Guaiacatis, 5 gr.		537
Magnes. Oleat, 5 gr.		600
Male Fern Ext., 3 m.		435
Meglin.		495
Mentholis		551
Meth. Blue, ½, 1, 2 gr.		331
Monckton		195
Morphinæ Mec., HCl., Sulph., ¼ gr.	556 *et*	*seq.*
Naphthol-*B*, 3–5 gr.		560
Naphthalini, 3 gr.		560
Neuralgic		260
Niemeyer		410
Ogilvie (Papain Co.), 1 *c. cib.*		651
Opii Pulv., ½ and 1 gr.		
Pepsin, 2 and 3 gr.		651
Pepsin, gr. 1, Quin. Sulph. gr. 1, Strych. 1/30 gr., Ext. Tarax. gr. 2. Sir— W. Gowers.		
Phosphori (Martindale), 1/100, 1/50 & 1/30 gr., 1 *p.c.*		671
,, c. Ferro et Nuc. Vom.		671
,, ,, Ferro, Quin. et Strych.		671
,, ,, c. Nuc. Vomic.		671
,, ,, c. Quin.		671
,, ,, c. Strych. et c. Ferro		671
Picis Liq., 2 gr., 1 or 2		691
Picrotoxini, 1/100 to 1/30 gr. *h.s*		841
,, Atrop. et Agaricin		841
Pilocarpinæ Nit., 1/20 to ½ gr.		531
Plumbi c. Opio, 2–4 gr. (about 12½% Opium)		

NAME.	DOSE.	PAGE
Pilulæ :—		
Plummer's, 4 to 8 gr. (Hyd. Sub. Co.)		
Podoph. Bellad. et Capsic. ..		694
Podophyllin, 1/30 to 1 gr. ..		693
,, Co., 1 or 2 *h.s.* ..		693
,, et Quin. *c. cib.* ..		693
Poore		693
Potassii Bichrom., 1/10 gr.		695
,, Iod., 1 gr., or more ..		700
,, Permang., 1 to 5 gr. ..		548
Potentin Co.		844
Quin. c. Bellad.		238
Quin. Hydrargyri et Opii ..		724
,, Ipecac. et Camphora..		725
,, Salicyl, 2–6 gr. ..		718
,, Sulph., 1 to 5 gr. ..		724
,, Valer. 1 gr. (and Co.)..		728
Rhei Co., 2½, 3,4 and 5 gr. ..		853
Pil. Rhei. Co., 4 gr. .. / Ext. Nuc. Vom., ½ gr. }	*t d.*	
Pil. Rhei. Co., 2½ gr. / Ext. Tarax., 2½ gr. }	*h.s.*	
Rufi = Pil. Aloes et Myrrh ..		
Salol, 2½ gr.		94
Santonin ½ gr.		735
Saponis, Co., (20% Opium), 2 to 4 gr.		
Scammon. Co.(B.P.'98),4-8 gr.		
Scillæ Co., 4 to 8 gr. ..		857
Sodii Arsenat., 1/32, 1/64 gr.		196
,, Cacodyl, ½ gr. ..		200
,, Chaulmoograte 'A,' 1, 2 & 3 gr.		609
,, Oleatis, 2 and 4 gr. ..		736
Spartein, Sulph., ¼ gr. ..		757
Spender, N.H.W. — Ferri. Sulph., 2 gr., Ext. Aloes 1 gr., Ext. Bellad., ⅛ gr. ..		
Strophanthi Tinct. 2 m. 1 to 3		764
Strych. 1/100 to 1/25 gr. ..		765
Sulphatum		276
"Third Night" Pil. Hyd., 1 gr. and Col. c. Hyos., 4 gr.		
Thyroglandin, 1 gr.		969
Triplex, 1 to 3		149
Trium Phosphatum ..		432
Unna's Chaulmoograte ..		610
Urgineæ Co., 4–8 gr. ..		864
Valerian Co. = Trium Valerianatum		728
Zinci c. Bellad., 1 or 2 ..		801
,, Phosph., ⅛ gr. 1 *t.d.* ..		677
Zn. Valer. Co., N.H.W. = Zn. Valer, 1½ gr., Asaf., 2 gr., Ext. Ballad., 1/12 gr.		
Pimento		849
,, Leaf Oil.		850
Pine Apple, 811; Essence		Vol. II.
Pineal body		949
Pinenes, Vol.II.; Pinheroin, 1dr., 687; Pink Pills, Vol. II.;		
Pink Root, Indian		860
Pinol		687
Pinus Canadensis, 850; Pinaster, 685; Pumilio, 687; Siberica, 687; Strobus, 850; Sylvestris		685
Piper Betle		816
Piper Long, and Nig.		850
Piper Methystic		838
Piperazin, 4 to 10 gr.; Tabs., 5 gr., 688; Benz.; Glyceroph. Salicyl., 2 to 5 gr.		689
Piperidine & Acid Tart., 15 gr.		689
,, -*p*-Sulpham. Benz...		689
Piperin, 1 to 10 gr.		850
Piperonal		833
Piroplasmosis		203
Piscidia, 850; Pistoia Powders		850
Pistachia Lentiscus		841
Pitch, Burgundy		690
Pitchblende 750 & Ra. Chaptr,		V. II.
Pitibulin..		953
Pituglandol		953
Pituitary Gland .	949 &	Vol. II.
Anatomy and Physiology ..		950
Surgery		951
Dry *Entire*, 1 to 3 gr. *t.d.* ..		952
,, *Anterior Lobe*, 1 to 4 gr.		952
,, *Posterior Lobe*, 1 to 4 gr.		952
Liquid Ext. *Entire* Gl. Special, ½ to 1 Cc. intram... ..		952
Liq. Anter. Lobe, 1 & 2 Cc.		952
Liq.Ext. *Infundib.*, ½ to 1 Cc. intram.		953
Assay		954
Phys. Examn. Author's ..		954
Contraindications to use of..		955
Uses and Refs. ..	955 *et*	*seq.*
In labour		956
Galactagogue Action. ..		956
Tablets Entire glds., 1 gr...		952
Pituitarin, Pituitrin		953
Pix Burgundica..		690
,, *Carbonis*		312
,, *Liquida*, 2 to 10 gr.	689 &	V. II.
Placenta, Placentine ..		Vol. II.
Plague		Vol. II.
Planadalin, 5 to 10 gr... ..		793
Plantago Ovata..		836
Plasma, Horse, 927; Isotonic..		745
Plasmodium Malariæ ..		Vol. II.
Plasmon Preps...		586
Plaster Mulls ..	563 &	Vol. II.
,, Paris and Bandages		275
Plasters, Rubber, White Adhesive, 563 *v.* also		285
Plastic Surgery, 366. *See* also Paraff. Dur.		
Platinum and Chloride, 850; Colloidal		372, 383
Pleurisy Root		814
Plumbi Acet., 1 to 5 gr. ..		691
,, Carb.		693
,, *Iodid.*, 693; Lact. ..		68
,, Nitras		692

NAME. DOSE.	PAGE
Plumbi Oleatum	603
,, *Oxidum*..	693
Plummer's Pill=Pil. Hyd. Sub. Co.	
Pluriglandular Ext. & Therapy.	970
Pneumobacillus & Coccus, 902 *et seq.* & Vol. II.	
Antibody Soln., Types I., II., III., 50 to 100 Cc... ..	905
Pneumococci, Types.. ..	904
Min. Health Rep.	905
Pneumonia	902
,, Vaccine, 50 m. to 2,000 mill	903
,, and Influenza, 900, 903, and Therap. Index 1049.	
,, Rockefeller Inst. Work..	904
,, Serum, 20 to 30 Cc. ..	905
,, ,, Pane	905
Pneumothorax, Artificial ..	637
Podophylli Res. & Indica., ¼-1 gr.	693
Podophylli Rhiz...	693
Podophyllin, ¼ to 1 gr... ..	693
Podophyllotoxin, 1/10 to ⅛ gr.	693
Points, Alum and Copper Sulph.	151
Poison Bush, 806; Oak, or Ivy	854
Poisons, Antidotes to.. ..	1063
(And *see* Drug in question).	
,, Arsenic Act.. ..	981
,, ,, Willcox's, B.M.A. Resolution ..	977
,, Gases	1064
,, Coloring of	982
,, Disinfectants ..	979
,, 'Known to Seller' Defined	982
,, Mineral Acids. ..	979
,, Orders in Council ..	979
,, Part I., 1923 Amendment *re* Sale ..	992
,, Percentages ..	992
,, Regulations for Keeping	980
,, Sales to Medical Men	981
,, 'Signed Orders' for	992
,, Horticultural and Agricultural (*e.g.*, Acid. Arsenios, Ac. Carbolic, Ac. Hydrocyanic, Cupri Aceto Arsenis, Nicotine, Mercuric Chloride) 190, 977, 980	
,, (Ireland) Act ..	982
,, Schedule (1908)	977, 978
,, Proposed Additions to Schedule ..	981
,, Through the post ..	981
,, Wholesale Trading..	980
(*See* also Dangerous Drugs Acts).	
'Poisonous' Substances ..	979
Poke Root	849
Pollacci's Solution	152
Pollens	663
Pollen Vaccine	897 *et seq.*
(*See* also Protein Therapy.).	

NAME. DOSE.	PAGE
Polonium	Vol. II.
Polygala..	858
Polygonum var.	850
Polyneuritis; Polyomyelitis	Vol. II.
Polyporus Officinalis	807
Polyvalent Sera	873
Pomatum Antipsoricum ..	772
Pomade Max	283
Pomegranate Bark	658
Pommade aux Concomb ..	825
,, de Lyon	482
,, Reclus.	335
Pond's Extract, 454; Tampons	448
Poore's Pill	693
Poppy Capsules..	626
Poppy Seed Oil..	619
Populus, Populin, 1 to 4 gr...	850
Portable Inhaler	550
Portland Cement	156
Potassa Caustica	694
,, *Sulphurata*, 2–8 gr. ..	695
Potassic Aperient (et c. Pot. Sulphoc.), 1 dr.	702
Potass. Acetas, 10–60 gr. ..	695
,, Arsenis, 1/32 to 1/16 gr.	195
,, Benzoas, 15–20 gr. ..	695
,, *Bicarb.*, 5–20 gr. ..	695
,, *Bichrom.*, 1/10–1/5 gr.	695
,, Binoxalas	73
,, Bismuthyl Tart. & Pot. Sod. Bi. Tart. ..	252
,, Bisulph.	702
,, Bitart, 15 to 60 or 240 gr.	703
,, Boro-tart., 20 to 40 gr.	703
,, *Bromid.*, 5–30 gr.	696 & V. II.
,, Cantharidas, 1–400 to 1–200 gr. hypod. ..	283
,, *Carb.*, 5 to 20 gr. ..	697
,, *Chloras*, 5–15 gr. ..	697
,, Chlorid.	697
,, Chloroplatinite	850
,, Chromate. ..	Vol. II.
,, *Citras*, 15–60 gr.. ..	698
,, ,, Eff, 1 dr.	—
,, *Cyanidum* (1/12–¼ gr.)	698 & Vol. II.
,, Dihydric-phosph. ..	702
,, Ferrocyanidum, 8 gr...	698
,, Formas, 1–6 to 3 gr. ..	40
,, Glyceroph., 3–8 gr. ..	44
,, Guaiac-sulphonate, 15 gr.	399
,, *Hydroxidum*	694
,, Hypophos., 1 to 6 gr...	678
,, *Iodidum*, 5–20 gr. ..	698
,, Margosate	814
,, Metabisulphis ..	Vol. II.
,, *Nitras*, 5 to 20 gr. ..	701
,, Nitris, ¼ to 1½ gr. ..	702
,, Osmas, 805; Oleas	601, 736
,, Oxalas Acid	73
,, Percarbonas ..	Vol. II.
,, *Permang.*, 1 to 3 gr.	546 & Vol. II.
,, Permang. Spray for C. Sp. Fever	888
,, Persulph. ..	Vol. II.

NAME. DOSE.	PAGE
Potass Phosphas, 1 to 10 gr...	702
,, Picras	76
,, Quadroxalate	73
,, Salicylas, 5 to 30 gr. ..	82
,, Silicas	752
,, Succinas, 5 to 10 gr. ..	103
,, *Sulphas.*, 15 to 45 gr...	702
,, ,, Acid	702
,, Sulphocarb., 10 gr. ..	702
,, Sulphocyanid., ¼ to 3 gr.	702
,, *Tart.*, ½ to 4 dr... ..	703
,, ,, *Acidus*, 15 to 60 gr.	703
,, Telluras .. .. Vol.	II.
,, et Sodii Tart., 120–240 gr.	756
,, Tetroxalas	73
Potassio-Mercuric Iodide ..	469
Potassium	694
Potion Gommeuse	1
Potato, Bacteriological Vol.	II.
,, Starch in Bread Vol.	II.
,, Sweet	836
Potentin Pilula Co., 3–6 p.d...	844
Potion Iodurée, 3 oz. in dil. ..	701
Potter's Walnut Juice Hair Dye	321
Potus Imperialis.	703
Poudre contre coryza	550
,, d'Ipecacuanha Opiacée, Max. single 15 gr. ..	515
,, de Reglisse Co. ..	832
,, de Scille	857
,, de Strophanthine au Centiéme, Max. single ½ gr...	764
Powell's Balsam .. Vol.	II.
Prayer Beads	804
Precipitate, Black, 464; Red, 482; White	463
Précipité Blanc..	478
Precipitin	869
Preface to Vol. I.	iv
Prescriptions, Analysis of D.D.A.	993
Preservative Solution .. .. (*See* also Milk, etc.).	21
Prickly Ash	867
Primula obconica	850
Procaine..	353
Producer Gas	457
Proflavine, 318; Patents, 318; Antiseptic Power, 319; Oleate Tablets	319
Proof Spirit .. 123 & Vol.	II.
,, ,, Conversion Factors	124
Proposote, 10 m. .. 396,	525
Proponal, 2 to 8 gr. 794 & Vol.	II.
Proprietary Foods, 586; Medicines .. .. .. Vol.	II.
Propyl Alc. Normal	131
Propylene	130
Propyl-piperidine	390
Prostate Gland..	957
Protargen	188
Protargol and Sterules of ..	188
,, Jelly	189
Proteins . .. 663 & Vol.	II.
Protein Therapy.	662
,, Skin Tests	663
Protein Test Papers	663
Protectives for Colloids. ..	369
Protoxalate de Fer, 1 to 5 gr...	430
Protozoa, *see* Amœbæ.. ..	
Pruni Virginianæ Cortex ..	850
Prunus *var.*	163
Psychotria Ipec..	513
Psyllii Sem.	851
Pterocarpus, 838, 851; Ptomaines *vide* Antidotes and	Vol. II.
Public Health (Venereal Diseases) Regulations	1002
Puerperal Fever Serum. ..	908
Puff Ball	840
Pulegium	851
Pulmonary Catarrh Vaccines in	882
Pulsatilla, 851; Pulque. ..	851
Pulverette Powder Pills ..	684
Pulv. Acetanilid Co., 3 to 5 gr.	3
,, Aloes c. Canella, 3 to 10 gr.	150
,, *Amygdalæ Co.*	164
,, *Antimonialis*, 3–6 gr. ..	178
,, Aromat., 15 gr. .. 819,	868
,, Basilicus, 4 to 8 gr. ..	480
,, Bismuthi Co. (et c.Morph)	248
,, *Buteæ Sem.*, 10–20 gr. ..	817
,, Calc. Chlorinatæ Ac. Boric	56
,, ,, ,, Mitis	57
,, Calcii Glycerophosph. c.	43
,, Lacte Exsicc., ½ oz. ..	
,, *Catechu Co.*, 10–60 gr. ..	
,, *Cinnamoni Co.*, 10 to 60 gr.	310
,, *Cretæ Aromat.*, 10 to 60 gr.	630
,, ,, *Aromat. c. Opio*, 10 to 60 gr... ..	630
,, Cretæ Co. (U.S.), av. 30 gr.	392
,, Doveri, 5 to 15 gr. ..	515
,, Dyspeptic Co.: Bism. Carb., Sod. Bic., Mag. Carb. *aa. p. æq.*, dose 1 drachm..	
,, Elaterin Co., 1 to 4 gr...	827
,, Glyceroph Co., 1 to 2 dr.	47
,, ,, cum Lacte, ½ oz...	43
,, *Glycyrrhizæ Co.*, 60 to 120 gr.	832
,, ,, sine Sacch... ..	832
,, Guaiaci Co., 20–40 gr. ..	770
,, Hypoph. Co., 1 to 4 gr...	679
,, *Ipecac. Co.*, 5 to 15 gr...	515
,, Ipecac. sine Emetin ..	514
,, Jacobi (*Antimonial.*), 3 to 6 gr.	178
,, *Jalapæ Co.*, 10–60 gr. ..	837
,, *Kaladanæ Co.*, 10 to 60 gr.	837
,, *Kino Co.*, (5% Opium) 5 to 20 gr.	—
,, Lecithin, 10 to 15 gr. ..	535
,, Liquiritæ Co., 60 to 120 gr.	832
,, Lobeliæ Co.	701
,, Magnes. Boro-Cit. Co. ..	14
,, Mag. Hydrox. c. Carb., 1 to 2 dr...	539
,, Menthol Cocaine Co. ..	550
,, Morphinæ Effervescens..	556

NAME.	DOSE.	PAGE
Pulv. Ol. Papav, 1 to 2 dr.	..	620
,, 'Old English' Fever	..	725
,, Opii, ½ to 2 gr. ..	..	629
,, *Opii Co.*, 5 to 15 gr.	..	630
,, Papain Co. ..	..	651
,, Pectoralis, 60–20 gr.	..	832
,, Pil. Coloc. Co. ..	..	390
,, Potass. Chloratis Co.	..	697
,, Pot. Nitritis Co., 43½ gr.		702
,, Potassii et Sodii Chloridi Co., ½ dr. ..	..	697
,, pro Pedibus ..	..	154
,, Quin. Co., 12 gr...	..	725
,, Quin. Arsen. Hydrarg et Ipec. Co. ..	..	725
,, *Rhei Co.*, 10–60 gr.	..	853
,, Rosæ Co... ..	..	847
,, Salicyl. c. Talco..	..	78, 81
,, Santonini Co., 5 gr.	..	735
,, *Scammonii Co.*, 10 to 20 gr.		—
,, *Sodæ Tart. Eff.* ..	..	756
,, Sodii Chloridi Co. (gargle)		745
,, ,, Nitritis Co. .		573, 702
,, Succ. Papav. Cap., ½ to 2 gr.	..	625
,, *Tragacanthæ Co.*, 10 to 60 gr.	..	787
,, Zinci et Amyli ..	..	801
,, ,, Oleat. Co...	..	154
Pumiline, 687; Pumpkin		825, 848
Punica Granatum ..	..	658
Punicine..	..	659
Purgatives, Hypod. (*see* Hyp. Purgatives).		
Purgen, ½ to 8 gr. ..	..	672
Purging Agaric . ..	..	807
,, Salt, Tasteless.	..	751
Purpuric Fever, Malignant	..	885
Pussy Willow	..	855
Putty Powder	..	860
Pyoktanin	..	328
Pyraloxin	..	77
Pyorrhœa alveolaris (Emetine in, 519), 906; Ionisation for		Vol. II.
Pyramidon, 5 to 8 gr., and Salts, 8 to 15 gr.		335, 336
Pyrazolonum-Phenyl-di-methyl. Salicyl.	..	336
Pyrethri Flores and *Radix*	..	852
Pyridine, 5 to 10 m. ..		845, 852
Pyrocatechin		Vol. II.
Pyrogallol, ½ to 1½ gr...	..	76
,, Acetate ..	..	77
,, -Bismuth, 2 to 8 gr.		250
,, Hair Dye ..		Vol. II.
,, Oxidatum ..	..	77
,, Triacet. ..	..	77
Pyrogenic Therapy. ..	..	670
Pyroxylic Spirit, 30 to 60 m...		128
Pyroxylin	..	364
Quackery		Vol. II.
Quassia, Quassin and Suppositories	..	852
Quebracho, 853; Quercus ..		853
Query's Serum		Vol. II
Queues de Cerise ..	..	497
Quevenne's Iron ..	..	424
Quillaia	..	853
Quince	..	826
Quinetum	..	709
Quinic Anhydride (Acid, 710)..		709
Quinidine		703, 705
,, in Auricular fibrillation..		705
Quinidine Sulph., 5 to 10 gr...		705
,, ,, Slipules, 5 and 6 gr.		706
,, ,, Sulph. Acid ..		706
,, Hydrochlor. ..	..	706
,, ,, Acid ..	..	706
Quinina, 1 to 4 gr. (Antimalarial 15 gr.)	..	709
,, as Local Anæsthetic ..		716
Quinine Absorption & Excretion		716
,, 'Activated'		141, 528, 709
,, Hæmoglobinuria..	..	715
,, as Local Anæsthetic ..		716
,, and Black Water Fever..		724
,, Solu. Isotonic ..	..	716
,, in Precipitating Labour		721, 724
,, Standard Treatment (U.S.) ..	..	721
,, Musc. Necrosis from injn.		721
,, Prophylactic use..	..	722
,, per Rectum ..	..	724
,, Synthetic.. ..	..	709
,, Wound Treatment	..	712
,, in Malaria. ..		712–725
Quin. Prophylaxis ..	..	722
,, Relapses ..	..	714, 722
,, Acetyl-Salicyl., 1 to 5 gr.		719
,, Aceto-Coumaras, 3 to 5 gr.		32
,, Arsenas, ⅛ to ½ gr.	..	710
,, Benzo Sulphon-Amino-phenylarsonas	..	222
,, Bisulph., 1 to 10 gr.	..	727
,, Camphoras, 1 to 10 gr...		710
,, Citras, 1 to 5 gr...	..	710
,, Di-ethyl-barbiturate	..	793
,, *Di-HCl.*, 1 to 10 gr.	..	713
,, Ferri Citras, 5 to 10 gr...		710
,, Carbonate . ..	..	728
,, Aceto Salicyl. Sulph.	..	719
,, Ethylcarb., 3–15 gr.	..	728
,, Fluorid., 1–20 to ½ gr. ..		805
,, Formas, 'Basic' (subcut. 1 to 3 gr.), 1 to 5 gr. and 'Neutral'	..	710
,, Glyceroph., 3 to 8 gr. ..		44
,, HI. and HI. Acid., 1 to 5 gr.	..	717
,, HBr., 1 to 5 gr.		711
,, ,, Acid., ½ to 2 gr. (hyp.)		711
,, *HCl.*, 1 to 10 gr... ..		712
,, ,, *Acid.*, 1 to 10 gr., ½ to 2 gr., hyp. ..		713
,, ,, Intrav Inj. 4 to 15 gr.		715
,, ,, Inj., Sterile ..		713
,, Carbamid., 5 to 15 gr.		717
,, -Sulph., 1 to 10 gr.		728
,, Hypophosph., 1 to 5 gr.		717

NAME.	DOSE.	PAGE.
Quin Iodas.,	1 to 5 gr.	.. 728
,, Iodide and Acid	.	.. 717
,, Lactas,	1 to 5 gr.	.. 717
,, Lygosinas,	1 to 3 gr.	.. 728
,, Nasal Douche	..	.. 725
,, Nucleinas,	1 to 5 gr.	.. 717
,, Periodid.	1½ to 3 gr.	148, 718
,, Phosphas,	1 to 6 gr.	.. 718
,, Phytin,	4 to 8 gr.	.. 680
,, Quinas,	1 to 10 gr.	.. 718
,, Salicylas,	2 to 6 gr.	.. 718
,, *Sulphas* (Acidus, 1 to 10 gr., 727)	..	.. 719
Sulphocarb.,	1 to 6 gr.	728
Tannas.	1 to 4 gr.	.. 727
,, Tylmarin,	3 to 5 gr.	.. 32
,, Valerianas,	1 to 4 gr.	.. 728
,, and Uran.Chlor.,	3 to 6 gr.	V.II.
,, Urea,	5 to 15 gr.	.. 717
,, Urethane,	½ –3 gr.	.. 797
Quinoform,	1 to 5 gr.	. .. 711
Quinoidine,	2 to 4 gr.	. .. 729
Quinol,	½ to 5 gr.	 835
Quinoline, 327; Blue		. .. 327

Rabies	.. .. .. Vol. II.
Radium Bromide, Carbonate etc.	.. .. Vol. II.
Radium Institute Reports	Vol. II.
,, Mache Units, Sources, Tests, Therap. Use, Transmutation Tables, etc.	Vol. II.
Radix Fraseri	 817
Ragazzoni's Injection	 468
Ragweed	.. .. 663, 858
Ragwort	.. .. .. 663, 858
Rami Syrup	 259
Ranunculus Ficaria	 853
Rape Oil	 738
Raspberry	 854
Rattlesnake Venom	 946
Rats, Squill for	 857
Ravaut's Paste	 528
Ravogli's Liniment	 20
Raw's Tuberculin	. .. 924
Rebipel Agar	.. .. Vol. II.
Reclus Pomade	 335
Rectified Spirit	 122
Rectal Feeding, *see* Enemata	. 414
Red Bone Marrow	 944
,, Gum, 5 to 20 gr., 828; Lead	693
,, Neutral (*see* also Neutral R.) 907 &	Vol. II.;
,, Precipitate	 482
,, Root	 838
,, Sanders' Wood	 851
,, Scarlet	 326
,, Soudan III.	 332
,, Water Fever	 203
Refrigeration	 25
Regenerative Tablets, 6 *p.d.*	.. 744
Reinsch's Test	Vol. II.
Relapsing Fever	203, 906
Remijia Species	 399
Remittent Fever	Vol. II.
Renaglandin, Renastyptin	960

NAME.	DOSE.	PAGE
Renner's Lymph	.. ..	934
Rennet, Essence, Tablets	..	659
Rennin	..637, 659, &	Vol. II.
Resina	.. ..	853
,, Carbolica, R.D.H.	..	21
Resinol Ointment Soap	..	691
Resorcin, 1 to 5 gr.	.. ..	730
,, Blue	.. ..	Vol. II.
,, Hair Lotion	..	..731
,, Ichthyol	.. .. ..	495
,, -monacetate	.. ..	731
,, phthalein Anhydride	..	673
,, Test for HCl.	..	Vol. II.
Resorcinol	.. .. ..	730
Respiration, Artificial	.. ..	158
Respirator Solution	.. ..	105
Rest Harrow	.. .. ..	847
Retinal Extract, 2 dr.	. ..	947
Revelliod's Method	.. ..	248
Rhamni Frangulæ Cortex	..	830
,, *Pursh*-Cort., 3 to 15 gt.	..	288
Rhatany Root	.. .. ..	838
Rhei Radix, 15 to 30 gr., 3 to 10 gr., rep.	.. .. ..	853
Rheumatism Serum and Vaccine (v. also Therap. Index	906,	908
Rheumatoid Arthritis—B. Coli intrav. in, 891; see also Therap. Ind.	.. ..	1052
Rhigolene	.. .. ..	658
Rhinoculin	.. .. ..	356
Rhino-Lacteol	.. .. ..	71
Rhodallin, 739; Rhodamines, 673; Rhodinal	..	Vol. II.
Rhodium Colloidal	.. ..	372
Rhotanium	.. .. ..	850
Rhubarb Leaves, 854; Root	..	853
Rhus Aromat., 854; Tox.	..	854
Rice and Beri-Beri 590, 848 &		Vol. II.
Ricin	.. ..	620
Rickets, 1053, Vol. II.; (*see* also Accessory Food Factors 591 *et seq.*)		
Rickets, Light in relation to		594
Rickettsia	.. ..	Vol. II.
Rideal-Walker Coefficient		Vol. II.
Ringer's Solution	.. ..	742
Ringworm, Therap. Ind., infective period	. .. ..	976
Rochelle Salt, 120 to 240 gr.		712, 756
Roeder's Gut	.. .. ..	536
Roentgen Rays	.. ..	Vol. II.
Romanowsky's Stain	..	Vol. II.
Room Disinfection		135, 139
Rosa Damascena, 847; *Gallica*		854
Rosalane	. .. .	466
Rosaniline HCl., ½ to 4 gr.	..	328
Roseberrys Mist. 1 oz.	. ..	725
Roseine and Aetate	.. ..	328
"Rose Oil"	.. .. ..	325
Roseola, Epidemic	.. ..	976
Rosettol	. .. .	847
Rosolic Acid	.. ..	Vol. II.
Ross, on Mal.Relapses	..	714
Rouge, Polishing	.. ..	104
Rubber, India, 284 and Vol. II.; Bandages	.. ..	284

NAME. DOSE.	PAGE
Rubber Dental	284
,, Gloves, 285; Substit. ..	365
Rubella	976
Rubia Tinctorum	854
Rubine	328
Rubini's Camphor, 2 to 5 m. .	279
Rubus Chamaemorus, etc. ..	854
Rue, 855; *see* also Harmine ..	833
Ruhmkorff Coil.. ..	Vol. II.
Rum	Vol. II.
Rumex Sp., Rumicin, 1 to 4 gr.	854, 855
Ruspini's Styptic ..	Vol. II.
Russian Paraffin Liq. . ..	654
Russolax, 2 to 4 dr.	654
Ruta	855
Ryutan	831
Sabadilla (Cevadilla)	865
Sabal, 857; Sabina	855
Sabouraud's Pastelles, Milk Serum..	Vol. II.
Sabromin, 15 to 45 gr. ..	513
Sambuci Rob	855
Saccharas Ferricus	424
Sacch. Ferric Oxide, 10 to 40 gr.	427
,, Wheat Phosph.	679
Saccharated Iron Phosph., 5 to 10 gr.	430
Saccharides	Vol. II.
Saccharin (and Sol.), ½ to 2 gr.	732 & Vol. II.
,, British, standard of ..	732
,, Tablets	732
Saccharomyces Cerevisiæ (*see also* Yeast)	292
Saccharum Lactis	839
,, *Purificat.*	732
,, Saturni, 1 to 5 gr. ..	691
Sacred Bark	288
Saffron	825
Safranine Test . ..	Vol. II.
Safrol, 20 to 30 m.	856
Sagapenum, 855; Sage ..	855
Sahli's Caps	684
St. Ignatius Bean	600
Sajodin, 15 gr.	513
Salacetin, 86; Sal Acetos ..	73
Salacetol, 10 to 30 gr. ..	93
Sal Alembroth & Injection ..	477
,, Ammoniac *v.* Ammon. Chlor.	
,, Bromatum Eff.,60 to 120 gr.	746
,, Carolinum, 20 to 60 gr. ..	754
,, Emsanum, Fact., 755; Hunyadi Janos, Vichy	755
,, Enixum	702
,, Limonis	73
,, Marimum Artif.	745
,, Polychrestum, 30 to 120 gr.	702
Salaspin, 5 to 15 gr.	86
Sale of Food and Drugs Act.	Vol. II.
Saletin, 5 to 15 gr.	86
Saline Solubes	742
,, Solution Normal.. ..	742
,, ,, Hypertonic . ..	743

NAME. DOSE.	PAGE
Salep	855
Salicifrice	737
Salicinum, 5 to 20 gr.	93
Salicyl. Piperaz, 2 to 5 gr. ..	689
,, Salicylate, 15 gr. ..	80
Salicylic Cream, 1 in 6½ ..	81
,, Gauze, Lint, Wool ..	81
,, Ionisation .	Vol. II.
Saligenin, 10 gr.	93
Salicylosol	81
Salicairin Tabs...	855
Saline Gelatin	435
,, Normal, 742, 116; Sterules	742
Saline & Ether, 116; Saline Hypertonic . ..	743, 744
Salipyrin, 15 to 30 gr. . ..	336
Salit (inunction), ½ to 1 dr. ..	79
Salix, *var.*, Nigra Discolor ..	855
Salol, 5 to 15 gr., 94; c. Camphora, 95; Catheter Oil, 95; Collodion, 95; Emulsion, Mouth Wash, 95; Pill Coating	95, 683
Salophen, 10 to 15 gr. ..	101
Salt Baths, 745; Salt free diets	745
Salt of Sorrel, 73; of Tartar ..	697
Salt Packs	743
Salts, Anti-Catarrhal, etc. ..	21
Salufer	752
Salvarsan	204
,, Copper	220
,, Silver	216
,, Sodium 0·3 to 0·45 Gm.	216
Salvarsanised Serum	214
,, Sodium Silver ..	217
See also Arsenobenzol.	
Salve Soap 843; Salvia ..	855
Sambuci Flores, 855; Sanagen	45
Sanaphos, 2 dr...	45
Sanatogen, 45; Samsonite ..	569
Sandal Wood Oil, 5–30 m. ..	622
Sandarach Solution	682
Sander's Wood, Red	851
Sandow's Baths	753
Sandoz Felamine	459
Sanguinarin, ¼ to 1 gr. ..	855
Sanguis Draconis, 827; Sanguisuga *vide* Hirudines ..	947
Sanitary Towels ..	449, 760
Sanitas and Preps.	687
Sanmetto	857
Sansiviera	855
Sanogyl	216
Santalol, Caps,. 5 m. Formagules, Tablets, 3 m.	622
,, Methyl Salicyl., 4 m. ..	623
,, Salicyl-ester 15 to 30 m	623
Santalum Rub.	851
Santal Oil	622
Santheose	778
Santoninum, 1 to 3 gr. ..	734
,, Golden, 2 to 5 gr ..	735
Santyl, 15 to 30 m.	623
Sanusin Sempules	249

NAME.	DOSE.	PAGE
Sapo Anim., Dur., Kalinus Medic., *Moll.*, 736; Moll. peroleat, 737; Venetus Virid, 736 *et seq.*		
,, Lanolin		111
,, Ol. Tereb.		687
,, Superadipat. (et c. Sulph et c. Pice)		737
,, Thymol		784
Sapones		736 & V. II.
Saponification Nos. of Fats.		Vol. II.
Saponin		856
Sappan		833
Sarcinæ		Vol. II.
Sargol		Vol. II.
Sarsæ Radix, Sarsaparilla		856
,, ,, Indian		856
Sassafras		856
Sassy Bark, 422; Sauerin		69
Saurolo		494
Savaresse's Capsules		623
Savory and Moore's Food		587
Savin Oil, 1 m., 855; Savore, 586; Saw-Palmetto, ½ to 2 dr.		856
Sawyer's Ointment		515
Saxonite		569
Scammoniæ Rad. (*Res.*, 3-8 gr.)		857
Scammonin, 1 to 5 gr.		837, 857
Scammonium, 5 to 10 gr.		857
Scarlatina and Vaccine		909
,, Infective Period		976
,, Serum		90 9
Scarlet Colors		326
,, Non-staining		327
,, Sceleth's Method		629
Schafer, Sir E. S. on Pituitary		950
Scheele's Green, 1/100 to 1/25 gr.		195
Schereschewsky's Quin. Ung.		713
Schiassi's Method		507
Schick Test in diphtheria		Vol. II.
Schierling.		390
Schindler's Jelly		189
Schedule of Poisons 978; Proposed Addns		981
Schœnocaulon		865
Scilla, 1 to 3 gr., 857; *Indica*		864
Sclavo's Anthrax Serum		880
Scoparii Cacumina; Scoparin.		758
Scopola *var.*		857
Scopolamine		488, 857
,, *HBr.*, 1/200 to 1/100 gr. 489; HCl. & HI.		490
Lævo.		489
,, Morphine Anæsthesia, 490; with Atropine		49
,, ,, ,, c. Ether Saline		110
Scordium		866
Scotch Paregoric, ½–1 dr.		632
Scotch Fir		685
Scott's Dressing		462
,, Emulsion		Vol. II.
Scutellaria (Skull-cap)		857
Sea Holly 828; Poppy, 831; Salt, Artificial, 745; Tangle, 839; Water, Artificial, 745; Water Treatment, 745; Radio Activity		Vol. II.
Seaweed		830
Sealed Tubes of Gelatin 435; Glucose, 438; Saline		742
Secale Cornutum, 15–60 gr.		415
Secondary List of Drugs		804
Secret Remedies		Vol. II.
Secretin Extract		946
Secretin		947
Secretogen Elixir, 1 to 2 dr. and Tabs.		947
Section cutting and staining		Vol. II.
Sedasprin, 5 gr.		97
,, Salts		98
,, Liberation of Br.		98
"Sedeff," 1 to 2 dr. in aq.		241
Sedobrol Tabs., 1 to 3 *p.d.*		258
Segra		829
Seidlitz Powder		756
Seigel's Syrup		Vol. II.
Seignette Salt, 120-240 gr.		756
Sel Anglais		540
Sel de Barnit, 107; de Javelle		51
Seleniol		388
Selenium		773
,, Colloidal, *see* Colliods		
,, Comps., Organic 774 &		Vol. II.
,, Oxide		773
Self Inflator Drops		304
Sempervivum		857
Semprolin Emulsion		656
Sempules, 774; Senecio. *var.*		858
Senegæ Radix		858
Senna (and *Pods*), 10 to 30 gr.		858
Sensitol Red, etc.		327
Sensitised Vaccines		938
Septicæmia Serum		908
Serpent Venom		946
Serpentariœ Rhizoma		859
Serum Agglutination		Vol. II.
,, Anti-colon B.		890
,, Antidiph. & Purif.		891, 892
,, Antilytic		927
,, Antimeningo		888
,, Antitetanic U.S.		912
,, Diphtheria 8,000 units (Proph. 500 to 1,000)		891
,, ,, 'Conc.'		892
,, Dysentery		893
,, Flexner's		889
,, Hæmostatic		928
,, Horse		927
,, Mineral Waters as		742 *et seq.*
,, Nevrosthénique		47
,, Normal Horse		927
(*SEE ALSO SPECIFIC DISEASES OR ORGANISMS AND VACCINES*)		
Sevum Benzoatum		676
,, Phosphoratum		676
,, Præparatum		676
Shale		654

NAME.	DOSE.	PAGE
Shaw-Mackenzie on Lipase	..	738
Sheep Dips	.. ..	190
,, Wool, 448; Shellac	..	859
Shipway Apparatus	.. ..	299
Sidonal, New, 30 gr.	.. ..	689
Sigmoidoscopy	.. ..	526 *et seq.*
Sil-Al., 1 dr.	.. .. ..	155
Silicosis	.. .. ..	752
Silcock's Ointment	.. ..	467
Silica 752; Silicon Carbide		Vol.II.
Silicates, Soda and Potash	..	752
Silk, Artificial, 452; Sutures	..	536
Silkworm Gut	.. ..	537
Silver Gelatose	.. .. ..	189
,, Hair Dye	..	Vol. II.
,, *Nitrate*, ¼ to ½ gr.	..	185
,, *Mitigated*	.. ..	187
,, ,, *Toughened*	..	187
,, *Oxide*, ½ to 2 gr.	..	187
,, Salvarsan	.. ..	216
Simaruba	.. ..	518, 859
Sinalbin, Sinigrin, Sinapis		738 & V.II.
Sinclair's Glue	.. .. ..	836
Singleton's Ointment	..	Vol. II.
Sirop des cinq. Racines	..	182
Sirop d'Erysimum, ½ oz.	..	828
(See also Syrupus).		
Skin Food, 454; Cream	..	787
,, Reactions	.. ..	662
,, Tests	.. .. ..	662
,, Sterilisation	.. ..	476, 508
Skull Cap=Scutellaria	..	857
Sleeping Sickness, Vol. II., and *v.* Therap. Ind.		
Slippery Elm Bark	.. ..	864
Slipules	.. ..	684
,, Eucaine & Sod. Chlor.	..	351
(See also Individual Drugs).		
Smallpox	.. ..	934, 976
,, & chickenpox diagnosis	..	935
Small-pox in England and Wales to sec. week September 1924—2750 cases.—B.M.J.ii/24,596; Lii/24,678.		
Smedley's Paste	.. ..	287
Smelling Salts, Carbol	..	21
Smilax Sarsaparilla	.. ..	856
Smoking, Anti-Gum	.. ..	852
Snake Bite, 946, 1055; Lancets		547
,, root, 823; Black	..	823
,, Venom	.. .. ..	946
,, vine	.. .. ..	829
,, weed	.. .. ..	829
Soamin, ½ to 3 gr. increased	.	201
Soap Bark	.. .. ..	853
,, Liniment	.. ..	737
,, Solution, Ethereal	..	737
,, and Spirit Lotion	..	737
Soaps. Household, Shavings Medicated, etc., 737 *et seq.* &		Vol. II.
Soda Caustic	.. .. ..	749
,, 'Crystal' Conc.	..	747
,, Tartarata, 2 to 4 dr.	..	756
Sodii Acetas, 15 gr.	.. ..	741
,, Acetyl-Am. Stibinate	..	181
Sodii Amino-Phenol arsonas, ¾ to 3 gr.	.. ..	201
,, Arsanilas	.. ..	201
,, Arsenis, 1-64 to 1-16 gr.	.	193
,, Arsenas. 1-40 to 1-10 gr.	..	196
,, *Benzoas*, 5 to 30 gr.	..	10
,, Benz.-sulph.-amino-phenylarsonas	.. ..	221
,, *Biboras*, 5 to 20 gr.	..	14
,, *Bicarbonas*, 5-30 gr.	..	746
,, Bism. Tart. for Injection		251
,, ,, ,, Acid 2 to 5 gr.		252
,, Bisulphas	.. ..	753
,, ,, Tabs. for baths	..	753
,, Bisulphis, 5 to 30 grains		755
,, Bi-uras	.. ..	Vol. II.
,, Boras	.. .. ..	14
,, Boro-Salicyl, 5 to 45 gr.	..	12
,, ,, Tart., 20 to 40 gr.	..	14
,, *Bromid.*, 5-30 gr.	. ..	745
,, Cacodylas, ½ to 1 gr.	..	199
,, Carbolas	.. ..	20
,, *Carb.* (*Exsicc.*, 3 to 10 gr., 747); 5 to 30 gr.	..	747
,, ,, Monohydrat	..	747
,, Chaulmoograte, Pure Commercial	.. ..	608
,, ,, 'A' 1 to 3 gr. *per os*		608
,, ,, 'C' 1 to 3 gr. *hypod.*		608
,, Chloras, 10 to 30 gr.	..	747
,, *Chloridum*, 10-60 gr.	..	741
,, Cinnamas, 3 to 5 gr.	..	29
,, Citras, 10 to 60 gr.	581,	748
,, *Citro-Tart. Eff.*, 1-2 dr.	..	
,, Coumaras Sol., 25 m.	.	31
,, ,, c. Novocain, 25 m.		31
,, ,, et Adrenalin, 35 m.		31
,, Desoxycholas	.. ..	757
,, Di-iodosalicyl	.. ..	86
,, Dimethylarsinas, ½ to 1 gr.		199
,, Dioxidum	.. ..	487
,, Dioxydiamido-arseno-benzene-mono-methane Sulphonate	.. ..	217
,, et Ammon. Phosph.	..	751
,, et Mag. Sulph. Eff., 1 dr. or more	.. ..	754
,, et Mag. Sulph. c. Caffeina 1 dr. or more	..	754
,, *et Potass. Tart.*, 120 to 240 gr.	.. ..	756
,, Ethylas (and Liq.)	..	749
,, Fluorid, 1-20 to ½ gr.	..	805
,, Formas, 1-6 to 3 gr. incr.		39
,, Glyceroph., 5-10 gr.	.	44
,, Glyco-cholas, 2-6 gr.	..	756
,, Gynocardas	.. ..	608
,, Hippuras, 5 to 30 gr.	..	11
,, Hydrosulphid.	. ..	105
,, Hydrosulphis.	.. ..	105
,, Hydroxid.	.. ..	749
,, Hydroxyamino-phenylarsinate	.. ..	204
,, Hypobrom., Sol.		Vol. II.
,, Hypochloris	,,	57 *et seq.*

NAME.	DOSE.	PAGE
Sodii Hypophosph.,	3-10 gr. ..	678
,, *Hyposulph.*,	10-60 gr.	105 & V. II.
,, Iodas,	1½ gr. Hyp. ..	65
,, *Iodidum*,	5 to 20 gr. ..	749
,, Indigo Sulphonas		Vol. II.
,, Lactas,	5 to 10 gr. ..	68
,, Mag. Sulph. Eff.,	60 gr. or *q.s.*	754
,, ,, ,, c. Caffein	..	754
,, Margosate	.. ..	814
,, Metarsenis	.. ..	193
,, Metabisulphis,	2 to 5 gr..	755
,, Methylarsonas,	2/5 to 3 gr.	200
,, Methylat ..	.. ..	749
,, Monoboras	.. ..	15
,, Morrhuas Solution (3%),	½ to 4 Cc. (Injected) ..	617
,, Nitras,	5 to 15 gr. ..	750
,, *Nitris*,	1 to 2 gr... ..	750
,, Nitrophenyl-propiolas		..V. II
,, Nitroprussidum ..		.Vol. II.
,, Nucleinas, *per os.*,	½ to 2 gr.	294
,, Oleas,	2 to 4 gr.	736
,, ,, in Tuberculosis	..	738
,, *o*-coumaras,	5 gr. in sol..	31
,, *o*-nitrophenylpropiol		Vol. II.
,, Perboras,	14; T. Powder and Mouth Tabs. ..	15
,, Permang...	.. ..	548
,, Peroxidum	.. 487,	634
,, Persulph.,	1 to 3 gr. ..	753
,, Phenol-p-sulphonas,	5 to 15 gr.	22
,, Phenol-sulphoricinas	..	621
,, Phenyl glycinamid Arsonate	.. .. ..	224
,, Phenylpropiolas	30 &	Vol. II.
,, *Phosphas.*,	¼ to ½ oz.; 30-120 gr. rep.	751
,, *Phosphas Acidus*,	30 to 60 gr.	751
,, ,, Eff.,	1 to 3 dr. ..	751
,, ,, Exsicc.,	10 gr. to 4 dr.	751
,, ,, Neutral (Tribasic)..		750
,, Phosphis ..	.. ..	750
,, Pot. Bism. Tart...	..	252
,, ,, Tartro Bismuthat...		252
,, *Potass. Tart.*,	2-4 dr. ..	756
,, Pyroborate	.. ..	14
,, Pyrosulphis,	2-5 gr. ..	755
,, Rhodanidum	.. ..	756
,, *Salicylas*,	10 to 30 gr.	82 & V.II
,, Santonas and Santoninas		736
,, Sesquicarb.	.. ..	747
,, Sesquiphosphas,	30 gr. during a day	752
,, Silicas,	752; Stearas ..	736
,, Succinas,	2 to 5 gr. ..	103
,, Sulphanilas,	5-15 gr. ..	321
,, *Sulph.*,	¼ to ½ oz. or 30 to 120 gr. rep.	753
,, ,, Eff.,	60 gr. or *q.s.* ..	754

NAME.	DOSE.	PAGE
Sodii Sulph. Exsicc.,	½ to 2 dr.	754
,, ,, Acidus	.. ..	753
,, Sulphidum	.. ..	755
,, *Sulphis*,	5 to 20 gr. ..	755
,, ,, Exsicc	.. ..	755
,, ,, Acid,	5 to 30 gr. ..	755
,, Sulphocarb.,	5 to 15 gr. ..	22
,, Sulphocyanid.,	1 to 5 gr.	756
,, Sulpho-Ichthyolas,	10 to 30 gr.	495
,, Sulphoricinas	.. ..	621
,, Tart. Neutrale,	½ to 1 oz.	756
,, Tartro Bismuthate	..	251
,, Tauro-chloas,	2 to 6 gr.	756 & Vol. II.
,, Tetraborate	.. ..	14
,, Thiocyanas	.. ..	756
,, *Thiosulph.*,	10 to 60 gr. .	105
,, ,, *Intrav.*	..	105
,, Triphenyl-rosanilinemonosulphonas	..	Vol. II.
,, Tungstas Sol. X Rays		..V. II.
,, Uras Acidus	..	Vol. II.
,, Valerianas,	1– 5 gr. ..	798
,, Vanadas,	$\frac{1}{32}$ gr.	864
Sodium ..	.. 741 &	V. II.
,, Fluorescein	.. ..	673
,, Salvarsan .	.. ..	216
,, Tylmarin,	5 gr.	32
,, Veronal,	5 to 10 gr. ..	793
Solanum, *var.*,	859; Sodomæum,	859
Solazzi,	832; Solubes.. ..	475
Soloform	.. .. ..	24
Sols, Colloidal ..	..367 *et*	*seq.*
,, ,, Iodine	.. ..	380
SOLUBES 475 (*see* also Solubes Ionic)		
,, Antimony Pot. Tart,	10 grs.	178
,, Sod Tart.	10 grs. . ..	179
,, Antiseptic Dental	..	20
,, Biniodide,	1 in 1 pint = 1 in 1,000 . .. 470 &	V. II.
,, Boric Acid,	15 gr. ..	13
,, Borax Cocaine Co.	..	13
,, Borax Co. .	.. ..	13
,, Boro-Saline	.. ..	13
,, Cocaine,	1, 1, 2 ⅛ ¼, 5 gr...	345
,, Dental	.. .. ..	20
,, Hyd. Cyanid, et Boracis		465
,, Hyd. Oxycy,	0.2 Gm. ..	466
,, Perchloride	.. ..	475
	1 to tumb. = 1 in 4,500	
	1 in pint. = 1 in 1,000	
	1 in pint. = 1 in 500	
,, Phenol,	5 & 20 gr. ..	18
,, Plumbi et Opii	.. ..	692
,, Potass. Permang.,	5 gr. ..	548
,, Sodii Chlorid.	.. ..	742
,, ,,	Comp. ..	744
,, Zinc Sulph. et c. Alum	..	803
,, Zn. Sulphocarb.,	2 & 10 gr.	22
,, Ionic	.. ..	Vol. II.
Soluble Glass	.. .. ..	752
Solurol,	5 to 10 gr.	966

NAME.	DOSE.	PAGE
Soluté d'Azotate d' Argent,		186
,, Digitaline Crist., max. single,	5 m.	411
,, de Quinine hypoderm.		716
,, de Valerianate d'Ammoniaque Comp.	2 to 4 dr.	159
,, Morphine (HCl.),	2%	556
,, Bromoform, max.,	8 m.	259
,, Officinale d'Eau Oxygénée		485
Solutio Amylocain, et c. Gluc.		357
Burowi		152
,, Creosoti Co.		395
,, Ethocaine & Co., and c. Adren.		354
,, Phenolis		18
,, Salina c. Acac.		1
,, Tri-iodo phenol.		24
,, Vanillin		865
,, Aluminii Acet.		152
Soluto de Cacodyl Iodo-mercurico		200
Solvent Naphtha		325
Somnoform		121
Soneryl. 1½ to 3 gr., 794; Tabs. 1 gr.		794
Sorbefacin		443
Sorbite		Vol. II.
Sorbus, 859; Sorghum		859
Soudan Red III.		332
Soya	619, 860 &	V. II.
Sozoiodol (and Comps.)		501
Spanish or Blistering Fly		281
Spahlinger's Serum		926
Spasmalgin Tabs. and Inj.		562
Spasmine 5 to 15 gr.		325
Spasmodin, 2 to 6 m. (in solution)		324
Sparteinæ HCl. and Sulphas, ¼ to 1 gr.		757
Sparteine Period, ½ to 3 gr.		148, 758
Spearmint		842
Spermatozoa		Vol. II.
Species Pectorales		832
Spermaceti		821
Sphacelotoxin, 1/100 gr.		418
Sphagnol and Preps.		496
Sphagnum (*see* also Moss)		758
Sphygmograph, Varnish		9
Sphygmomanometers		Vol. II.
Spigelia Marilandica		860
Spinal Anæsthesia. *See* Anæsthesia & Drugs in question.		
Spinal Cord Ext. (5–20 m.)		945
,, ,, Tabs., 2½ gr.		945
Spirillum Choleræ, 854; *see* also Spirochæta.		
Spirit Weed		838
,, of Tar		690
Spirit Acidi. Lactici		66
,, *Aetheris*, 60 to 90 m., 20 to 40 m. rep.		118
,, ,, Camph.		392
,, ,, Co, 60 to 90 m., 20 to 40 m. rep.		118
Spirit Aetheris Nitrosi,	16 to 60 m.	118
,, Ammon., U.S. viii,	15 m.	162
,, ,, *Aromat.*,	60 to 90 m., 20 to 40 m. rep.	162
,, ,, *Fetidus*,	60 to 90 m., 20 to 40 m. rep.	162
,, Amygd. Amar.,	av. 8 m.	164
,, *Anisi*,	5 to 20 m.	812
,, Antiparalyticus		687
,, *Armoraciæ Co.*,	1 to 2 dr.	824
,, Aurantii Co., U.S.		413
,, *Cajuputi*,	10%, 5 to 20 m.	817
,, *Camphoræ*,	5 to 20 m.	277
,, ,, Fort.,	2 to 5 m.	279
,, Capillaris		730
,, Card. Co.		640
,, *Chloroformi*,	5 to 40 m.	305
,, *Cinnamomi*,	5 to 20 m.	310
,, Coloniensis		127
,, Creosoti,	1 dr.	394
,, Denaturalised		128
,, Dilutions, 122, 124 and		Vol. II.
,, Duty and Rebate		123
,, Dzondii		162
,, Frumenti		127
,, Glycerin		126
,, Glyceryl Nit.,	av. 1 m.	570
,, Grindeliæ Co.,	1 to 2 dr.	453
,, Hyd. Biniodidi		467
,, Isopropyl		131, 132
,, *Juniperi*,	5 to 20 m.	837
,, Co., U.S.,	av. 2 dr.	837
,, *Lavandulæ* (10% of Oil),	5 to 20 m.	
,, Melissæ Co.,	20-25 drops	842
,, Menthæ Pip.,	5 to 20 m.	842
,, Methylatus, 128; Industrial; 129 'Power'		130
,, Rebate		123
,, Myrciæ		127
,, *Myristicæ*,	5 to 20 m.	844
,, Nuc. Jugl.,	1 to 4 dr.	837
,, Prohibition		126
,, Proof	123 &	Vol. II.
,, *Rectificatus*	122,	Vol. II.
,, Saponatus, *var.*		737
,, Sinapis, P. G. V.		739
,, Tenuior	123 *et*	*seq.*
,, Thymol,	3 to 15 m.	785
,, Vanillin Co.,	½ to 1 dr.	865
,, Vini Rect. & Dilutus	122	V. II.
,, Vini Gallici	127 &	V. II.
Spirits Act, 1915		123
Spirochæta, *var.*		Vol. II.
,, Pallida	207 &	Vol. II.
Spirone Inhalant		701
Spironema Pallidum	207 &	Vol. II.
Spleen Desicc.,	5 to 10 gr.	957
Splenomegaly, Tropical		Vol. II.
Splints, Celluloid		366
Sponge Eduction		449
Sponges, Surgical		449
to Sterilise		Vol. II.
Spongio Piline		448, 449
Sporotrichosis		Vol. II.

NAME. DOSE. PAGE

Spot Wing, *A. Maculipennis* Vol. II.
Spotted Fever 885
Sprays (Cocaine). 345
Sprue .. .. 830 & Vol. II.
Spruce, Hemlock 850
Spurge, Petty 829
Squill 857, Red, ... 857
Stabilarsan 216
Stainless Iodine Ointment .. 511
Stains, to remove .. Vol. II.
Standard Bread .. Vol. II.
Stannum 860
Stanni Oleas 605
,, Oxid. 860
Stannoxyl Tablets 860
Stavesacre 861
Staphisagriæ Oleum & *Ung.* .. 861
,, *Sem.*, 1 gr. 861
Staphylo. Alb., aur. V. II. Vaccine 910
Star Anise 812
Star Grass 808
Starch, 811; and Boric. Powders 801
Starchless Bread 588
Steapsin, 637; Stearin .. 102
Stearettes 683, 776
,, Calcii Sulphidi, 1 gr. .. 275
,, Emétine, ⅓ ⅔ gr. . .. 520
,, Emetine Bism. Iodid., 1, 2 & 3 gr. 522
,, Fel Bovini, 5 gr... .. 423
,, Magnesium Peroxid., 3 gr. 487
,, Sulphur, 5 gr.. 771
,, Other Comps. 683
Stedman's and Steedman's Powders .. .. Vol. II.
Stegomyia .. .. Vol. II.
Steinach Operation 965
Sterilisation of the Skin 476, 508
Sterilla 737
Sterilisation, Chapter .. Vol. II.
Sterilised Milk 582 *et seq.*; Olive Oil, Paraffin, etc. .. 164
Sterilisers 584
,, Tubes for .. Vol. II.
" Steriloid " Dressings, 449
Jacket 743

STERILOIDS.
Atropine 1/400, 1/200, 1/100 gr. 144
Cocaine 1/60, 1/50, 1/30 gr. 144
Codeine 1/16, 1/4, 2/7 gr. .. 144
Diamorphine 1/50, 1 30 gr... 144
Emetine, 1/18, 1/14, 1/9 gr... 144
Morphine, 1/160 gr. .. 144
Quinidine, 1/60 gr. 1/50 gr. . 144
Quinine .. ..1/60 gr. 144
Strychnine, 1/360, 1/180, 1/90 gr. 144

STERULES, HYPODERMIC.
760, each containing :—
Acac. Gum (Intrav.) .. 2
Aconitine Nit., 1/600 gr. .. 110
Adrenalin Sol., 10 to 15 m. 964

NAME. DOSE. PAGE

Sterules, Hypodermic—*contd.*
Andrenalin Solution, 1/1000 gr. with Cocaine, ⅓ gr. .. 964
Adrovaine (Adrenalin, $\frac{1}{250}$ Stovaine, ⅓ gr.) 964
Adreucaine, ½ Cc. 351
Æther, ½ dr. 114
Aq. Dest., 1 dr. 231
Amyl Nitrite, 15 m., hyp. dose, 1 to 5 m. 169
See also Sterules, Inhalation.
Antimon. Cinnam. Inj., 15, See also Sterules, Inhalation. 30 m. 174
,, Ox. Inj., 15, 30 m. .. 170
,, Pot. Tart, ½ to 2 gr. (Intrav.) 178
,, Sod. Tart. ½ to 2 gr. (Intrav.) 179
Antipyrin, 4 gr. 334
,, et c. Cocaine, 1/20 gr. 335
Apomorph. HCl., 1/10 gr. .. 183
Arrhenal, ⅓ and ¾ gr. .. 201
Arsamin, ½ and ¾ gr. in 15 m. 202
Arsenic and Iron = ½ and 1 mgr. As_2O_3 in 15 m. .. 196
,, and Strychnine = 10 m. 197
,, Stychnine & Quinine 10 m. 197
Arsenii Iodidi, 1/100 gr. .. 194
Atrop. Sulph., 1 100 gr. .. 228
Auri Chlor. (*see* also Gold Colloid) 234
Becker's Solution (half strength), 3 Cc. 52
Benzamine, ¼ and ½ gr. .. 350
Bismutol 254
Brandy, 1 dr. 127
Butyn 1 & 2 %, 1 Cc. .. 359
Cacodylatum Co., 15 m. .. 200
Caffeine and Novocain .. 355
,, Sod. Benz., 1 to 4 gr... 264
,, 2 gr., in 5 Cc. Intrav. 264
,, Sod. Salicyl., 1, 2 gr. 264
Calcii Format., ¾ gr. .. 40
Calc. Glyceroph., 1 gr. .. 42
Calomel, ⅛, ¼, ½, ¾ and 1 gr. 480
Camphor (in oil), 1½ and 3 gr. 278
,, ½ gr. in Ether, 15 m. 278
Camphor, 3 gr. & Guaiacol, 2 gr. 278
Cicatricine, 15 m. 740
Cinchonidine HCl. Ac. 7½ gr. (Intram.) 707
Cocaine HCl., 1, 10, ¼ and ½ gr. 345
,, ⅓ & Adrenalin, 1/1000 gr. (Conephrin) .. 345
Cocaine et Sod. Bic.. Dry. (Urethral) 346
Codeine Phosph., 1 gr. in 6 m. 362
Colloidal Metals, see "Sterules" of Metals in question
Copper Colloidal, 4 Cc. (1 in 2000) 378
Creosote (in oil), ¾ gr. ..
Curschmann's Soln., 1 Cc. ..

NAME.	DOSE.	PAGE
Sterules, Hypodermic—*contd.*		
Diamorphine, HCl.,	1/12 gr.	559
Digitalin, Pulv.,	1/10 gr. ..	412
,,	1/10 gr. c. Strych. HCl., 1/100 gr.	412
Dionin,	⅛ gr.	558
Emetine HBr. & HCl.,	⅙ to ½ gr.	520, 554
Enesol, 2 Cc.	.. .. ..	201
Ergot Inj., 10 m.	.. ..	417
Ergotinine Cit.,	1/100, 1/200 gr.	418
Eucain, HCl. & Lact.,	¼, ½ and 1 gr.	350, 351
Eucalyptus Oil., 5 m. c. Ol.		615
Ferri Am. Cit.,	½ and 1 gr., and with Quin. Urea (and both c. Strych.)	425
Ferri Glyceroph.,	½ gr. ..	44
Fibrocoumarin, 25 m.	..	31
	25 m. c. Adrenalin, 10 m.	31
Gelatin Conc.	.. ..	435
Glucose (Intrav.)	.. ..	438
Glyc. Sod. Cinnam.	.. ..	30
Gold C oll., 5 Cc. (1 in 4000)		380
Guaiacol (in oil),	¾ gr. ..	397
,,	Cacodyl., ½ to 2 gr. ..	198
Guaiacol-Glucose 2 Cc. for Novarsenobenzol	..	218
Gum Acac. (Intrav.)	..	2
Hamamelis Ext. and Phenol.		355
Hydrarg. Coll., 5 Cc. (1 in 2000), (and c. Sulph.)		382, 383
Hyd. Cyanid. 1/12,	⅛ gr. (Intrav.)	465
Hydrarg. Lambkin 10 m.	..	460
Hyd. Glycocoll.,	⅛ gr.	7
,,	Iod. Rub., 1/12 gr. in 8 m.	468
,,	Peptonat, ⅛ gr. ..	472
,,	Salicyl-Arsonas, 1 gr. in 30 m.	201
,,	Subchlor., ¼, ½, ¾ and 1 gr.	480
,,	Succinimid., ⅓ gr. c. Cocaina Nit., ⅛ gr. .	481
Hydrastinine HCl.,	¼ gr. ..	484
Hyoscine HBr.,	1/100 gr., 490; et c. Morph., ⅙, etc.	491
Hyoscine Comp.	.. ..	491
Inj. Hydrarg. Intramusc.,	10 m.	460
Iodine (local).	.. .. ..	508
Indigo Carmine	..	Vol. II.
Iodinol, 30 & 60 m.	..	503
Iodoform c. Menthol	..	499
Iron and Arsenic—		
	No. 1 = ½ mgr. As_2O_3 ..	196
	No. 2 = 1 mgr.	196
Iron Citrate.	½ and 1 gr. ..	425
,,	,, 2 grs. c. Ureauin.	425
,,	Glyceroph., ½ gr. ..	44
Lecithin,	¾ gr.	535
,,	c. Guaiacol, ¾ gr. ..	535
,,	c. Strych., 1/120 gr. ..	535
Locke's Soln. Conc.	..	742
Mang. Butyrat.	1%, 1, 1½ and 2 Cc.	545
Menthol,	1/5 gr.	550
Mercurial Injn.,	10 m. ..	460
Mercurochrome,	*vesical inj.*	674
Methylene Blue	..	Vol. II.
Morph. Sulph.,	⅛, ⅙, ¼ & ½ gr.	557
Morph.,	⅓ gr. c. Atropine Sulph., 1/120 gr., and other strengths	557
Normal Saline (conc. 384)	..	742
Novocain,	⅛ gr.	354
,,	⅓ gr. c. Adrenalin, 1/1000 gr.	354
,,	0·15, Caffeine 0·12 and Sod. Benz. 0·15 Gm.	355
Nucleinic Acid,	¾ gr. ..	294
Ol. Terebinth in Oil	..	686
Peptone (and intravenous)		666
Phenolsulphonephthalein	..	V. II.
Pilocarpine Nitrate,	1/10, ¼, ½ gr.	533
Pituitary Ext. (Infundib.),	½ and 1 Cc.	953
Pituitary Ext. (Anterior),	1 and 2 Cc. (20 and 40%) ..	952
Pituitary Extract,	½ and 1 Cc. *Entire Gland Special*	952
Platinum Coll.,	5 Cc. (1 in 4000)	383
Potass. Iod.,	5 gr.	700
Quin. Formas,	⅓, ¾ grain ..	711
,,	Glyceroph., ½ gr. ..	44
,,	HBr. Acid, 2 gr. ..	711
,,	HCl. Acid, 2 gr., 3 gr., 5 gr. and 15 gr. ..	716
,,	4 & 10 gr. Intrav. ..	716
,,	,, ,, 5 gr. c. Antipyrin, 3 gr.	717
,,	Hydrochlorocarbamid., 3 and 5 Cc., 1% ..	717
,,	Urea (& c. Eucaine), and 5 Cc.	717
Quinidine HCl. Ac.	5 and 10 gr. (Intrav.) .	706
,,	,, 5 gr. Intram.	706
Ringer's Sol. Conc.	.. ..	742
Saline Conc.	.. ..	384
Scopolamine-Morph.,	1/100 and ⅛ gr., and with Atrop.	491
Selenium Coll.,	1 to 5 Cc. (1 in 5,000)	384
Silver Coll.	5 Cc. (1 in 2000)	385
Sod. Arsenatis et Strych.,	10 m.	196
,,	,, ,, et Quin., 10 m.	197
,,	Chloride	742
,,	Cacodyl, ¾ gr. ..	200
,,	Sod. Chaulmoog ..	
,,	'C,' 1, 2 and 3 gr. ...	609
,,	Cinnam. (Glyc., 30 m.)	30
,,	Formate, ⅛, ½ gr. ..	40
,,	Glyceroph., 3 gr. ..	45
,,	,, 1½ c. Strych. Cacodyl., 1/64 1/20 gr. ..	45
,,	Iodid. 1 gm. (Intrav.)	749
	Nitritis, ⅛, ⅔, ¾ gr. ..	750
,	Nucleinate, ¾ gr. ..	294
	o-Coumarate Sol., 25 m.	31
,,	,, c. Kerocain, 1/5 gr.	31
,,	, et Adrenalin 10 m.	31

NAME. DOSE. PAGE

Sterules, Hypodermic—*contd.*
Sod. Salicyl., 1 Gm. (and c. Sod. Iod. 1 Gm.) (Intrav.) 85
Stovaine, ⅛, ½, ¾ gr. . .. 357
c. Caffeine 358
c. Dextrin Sol., 1·5 and 2 Cc. (Intraspinal) 357, 358
,, GlucoseSol., 1 Cc. .. 356
,, Strychnine, 1 Cc. .. 358
Strych.Sulph, 1/100, 1/50 gr. 767
Sulphur Coll., 5 Cc. (1 in 1,000) 386
Testicular Ext. c. Glyceroph., 2 gr., c. Strych., 1/60 gr. 10 m. 965
Thiosinamin, Comp., 1& 2 Cc. 740
with Antipyrin = 15 m. .. 740
ThoriiAceto-coum., 10 m. .. 32
Trichlorethylene, 10 m. .. 306
Tuberculin Dilutions 919 *et seq.*
Turpentine in Oil 686
Tylcalsin 0·5 and 1 Gm. (Intrav.) 91
Tylnatrin 0·5 and 1 Gm. (Intrav.) 91
Tylmarin Thorium, 10 m. .. 32
Urea-Quinine and c. Eucaine 717
Water Distilled 231
STERULES, INHALATION .. 760
Amyl Nitrite, 1 to 10 m. .. 165
Chloroform, 10 ,20, 30 and 60 m., also 1, 2, 4 oz. (Anæsthetic) 303
Ether, 1 and 2 oz. 113
Ethyl Bromide, 5 m. .. 807
Ethyl Iodide, 5 m. 121
,, c. Chlorof. 122
,, ,, ,, et Menthol 122
STERULES, IONIC, Cocaine, Copper, Lithia, Magnes, Mercury. Pot. Iod., Quin. HCl. Ac., Sod. Chlor., Zinc 760, & V. II.
STERULES, LOTION for diluting 1 to 1 pint:—
Hydrarg. Perchlor. 475
,, Biniodid 470
,, Oxycyanid. 466
Potass. Permang. 548
Saline Soln. (for 2 pints) .. 742
STERULES, OPHTHALMIC .. 760
Adrenalin Chlor. 964
Atrop. Sulph., 1% 228
,, Sulph., ½% with Cocaine (HCl.) 2½% .. 229
Cocaine HCl., 10 gr. to oz. & tube form) 345
Dionin, 5% 558
Fluorescein et Sod. Bic. .. 673
Holocaine, 1% 352
Homatropine, HBr., 1% .. (et c. Cocaine, 2½%) .. 231
Physostigmin., 4 gr. to oz. .. 681
,, 1 gr., et c. Coc., 4 gr. .. 681
Pilocarpine Nit., 0·5% .. 533
Protargol, 10 and 25% .. 188

NAME. DOSE. PAGE

STERULES, LARGE (TUBE FORM) 10 min., Cocaine HCl., 5, 10% 345
Stibenyl ¾ gr. (Intrav.) .. 181
Stibium Sulph. 170
Stibnite 169
Stillingia, 30 gr. 861
Stinging Nettle 39
Stockholm Tar 2 to 10 gr. .. 689
Stokes' Liniment 686
Stomach Contents Exam. Vol. II.
,, Tubes 285
Stomachic balsam 844
Stone Root 824
Storax 861
Storks-bill 828
Stovarsol, 4 grs. *bis die* .. 530
Stovaine, ⅛ to ¾, max. 2½ gr. 356; Stovaine-Dextrin, 357; Gargle, Ointment Pastils, Snuff, Solution (internal) .. 359
Stovaine-Caffeine 358
Stovaine-Glucose 356
Stovaine-Strychnine 358
Stramonium 761
Strawberry 830
,, Ext. Ethereal .. 830
Streptococcus & Serum .. 908
,, Hæmolytic, 909; and *see* Influenza.
,, Conglomeratus .. 909
,, fæcalis .. Vol. II.
,, Rheumaticus. .. 907
StrontiiBrom. (Exsicc., 4–24 gr., 762); 5–30 gr. .. 762
,, Carb., 5 to 30 gr. .. 762
,, Cinnam., 2 to 5 gr. .. 30
,, Glyceroph., 4 to 8 gr. .. 45
,, Iodid., 5 to 20 gr. .. 762
,, Lactas, 5 to 30 gr. .. 762
,, Oleas, 5 to 20gr. (?) .. 605
,, Salicyl., 5 to 20g r. .. 763
Strophanthi Semina 763
,, Phys. Standardised. 764 & V. II.
Strophanthin, 1/300 to 1/100 gr. 763
Strychnina, 1/64 to 1/16 gr. .. 765
,, Antidotes 765
Tests .. Vol. II.
Strychninæ Acetas, 766; Arsenas, 1/64 to 1/16 gr., 766; Cacodylas, 1/30 to 1/10 gr., 200; Formas, 1/64 gr., 40; Glyceroph., 1/64 to 1/20 gr., 46; HBr. and HCl., 766;
Strychnin. Hypophosph., 766; Nitras, Phosph. Acid., Sulph. and Sulph. Acid, 1/64 to 1/16 gr., 766, 767; Periodid, 1/100 gr., 148, 767; Valerianas, 1/25 to 1/10 m. 767
Strychnos, *var.* 598, 600
Styptic Colloid, 366; Gelatin, 964; Wool 426

NAME.	DOSE.	PAGE
Stypticin, ¼, ½ gr., or if urgent up to 4 gr.	.. .. ..	566
Stypticin Gauze and Wool	..	567
Styptol, ¾ gr. incr.	.. ..	567
Styrax Prep., av. U.S., 15 gr.		861
Styryl Quinoline	.. ..	327
Sublimate Disinft., 475 ; Malachite Green Soln., 329 ; Spirit, 476 ; Gauze, Wood Wool	..	474
Succinimide	.. .. ..	481
Succinum	.. .. ..	861
Succus Agavæ Conc., ½ oz.	..	851
,, Allii, 10 to 30 m.	..	808
,, Alterans, 1 dr.	.. ..	861
,, Ari, 1 dr.	.. ..	813
,, Conii, B.P. '98, 1 to 2 dr.		
,, Galii, 1 to 2 dr.	.. ..	831
,, Limonis (*see* Neutralisation Table).	.. ..	
Mori, 1 dr.	.. ..	843
Papav. Somnif. (Cap. Inspiss. (and Pulv.), ½ to 2 gr.	.. ..	625
,, *Scoparii*, 1 to 2 dr.	..	
,, Sempervivi, 5 to 15 m.		857
,, *Taraxaci*, 1 to 2 dr.	..	863
,, Urticæ, 1 to 4 dr., incr.	..	39
Sucrose, Sugar, 732; Intrav. use	.. ..	733
Sudan Red	.. .. ..	332
Sugar Cane, 732; Chinese 859; Coating, 683; Grape, 438; Inverted 733, of lead	..	691
Sugars, Bacteriological	..	V. II.
Sulfarsenol	.. .. ..	220
Sulphaqua Charges	.. ..	772
Sulphonal, 10 to 30 gr. 768 &		V. II.
,, Reversed	.. ..	769
Sulphone-ethyl-methane	..	769
Sulphondichloramino-benzoic Acid	.. ..	63
Sulphonmethanum	.. ..	768
Sulphur	.. ..	770
Sulphur. Lime Depilatory	..	276
,, Colloidal	.. 372, 386,	770
Sulphur Dioxide and Trioxide		104
Sulphuretted Hydrogen	..	771
Sulph. Chlor. ,Hypochlor.	..	771
,, Iodidum	.. .. ..	771
,, Lotum	.. .. ..	770
,, *Præcip.*, *Sublim.*, 20 to 60 gr.	.. .. ..	770
Sumach, 15 gr.	.. .. ..	854
Sumbul Radix. av. 30 gr.	..	861
Sundew	.. .. ..	827
Sunflower Oil	.. .. ..	619
'Sunic' Coil	.. ..	V. II.
,, Screens	.. ..	V. II.
Sunlight	.. ..	V. II.
Superol	.. ..	327
Suppositories, 774; Hollow 442 ; Mass for hot Climates, 774 ; Vaginal	.. ..	442
Suppos. Acidi Borici, 3 gr.	..	13
,, ,, *Carbol.*, 1 gr.	..	21
Suppos. Acidi Lact. B.	..	72
Suppos. *Acidi Tannici*, 3 gr., and with Morph., ½ or Opium, 1 gr.		106
,, Adrenalin, 10 m.	..	964
,, ,, c. Formidin. Cocain & Hamam.	..	964
,, Aloes	.. .. ..	151
,, Argyrol	.. .. ..	187
,, Aristol 1 gr.	.. ..	500
,, Atropinæ et Plumbi Iod.		229
,, Bellad., 1½ gr.	.. ..	238
,, ,, et Morph., ¼ gr.	..	238
,, Bisciniod, ½ gr.	.. ..	243
,, Bismuthi Oxychl., 10 gr.		245
,, ,, Salicyl., 10 gr.	..	245
,, ,, Subnit., 10 gr.	..	
,, Chloral, 5 gr.	.. ..	296
,, Chrysarobin, 1¼ gr.	..	308
,, Cocainæ, ⅛ to ½ gr., et c. Morphina, ½ gr.	..	346
,, Cocainæ Vaginal, 2 gr.	..	345
,, Collargol (& Co.), 2½ gr.		188
,, Cubebæ, 10 gr.	.. ..	399
,, Eucalypti, 5 gr.	.. ..	828
,, Gallæ, 5 gr., et c. Opio, 1 gr.	.. .. ..	
,, *Glycerini*	.. ..	442
,, Hæmorrhoidal	.. ..	249
,, Hamam Co.	.. ..	455
,, Hamamelin 1 and 3 gr.	..	455
,, ,, et Hydrarg. Co.	..	455
,, Hamam., Conii et Eucain		455
,, Hydrargyri	.. ..	461
,, ,, Subchlor., 1 gr.	..	480
,, Ichthyol, 3 gr.	.. ..	495
,, Iodex.	.. .. ..	511
,, *Iodoformi*, 1, 3, 5 gr.	..	499
,, ,, c Eucalyp. Oil. 5 m.		
,, Malourea 4 to 8 gr.	..	791
,, *Morphinæ*, ¼ gr.	.. ..	556
,, Novarsenobenzol 0.1 Gm.		220
,, Nutrient	.. .. ..	662
,, Olei Cinerei	.. ..	461
,, Opii, 1 gr.	.. ..	
,, Pep. Beef	.. ..	662
,, Quassiæ Ext., ¼ gr.	..	852
,, Quin. HCl., 5 gr.	..	712
,, ,, Hydroch. Carbam. 5 gr.	.. ..	717
,, Ranunculi	.. ..	853
,, Santonini, 3 gr.	.. ..	735
,, Sod. Chaulmoograte 'A,' 1 to 3 gr.	.. ..	609
,, Supra-renal (et c. Morph.)	.. ..	959
,, Thymol Iodide	.. ..	500
,, Veronal, 4 to 8 gr.	..	791
Supplementary List	.. ..	804
Suprarenal Cortex Sicc., 2 to 5 gr.	.. ..	965
Suprarenal Gland, Ext. Dry, Liq., Suppos. (et c. Morph., ½ to 3 gr.), Inj. (Hypod)., Snuff, Spray, Tabellæ, Tablets, 1 or more, Ung., 958 *et seq.* and	.. ..	Vol. II.

NAME.	DOSE.	PAGE
Supra-renin.,	.. .. ..	960
Supsalvs.	.. .. ..	211
Surgeon's Agaric	.. ..	810
Surgical Dressings Sterilisation	.. .. ..	Vol. II.
Surgical Lubricant	.. ..	19
Surgical Soap	.. .. ..	737
Suspensoids	.. .. ..	368
Sutures	.. ..	536
Swabs, Steriloid, Triang., etc.		450
Sweet Gale, 816 : Vernal Grass		812
Sydenham's Laudanum, 5 to 20 m.	.. .. ..	632
Syls, 1 to 2 drachms :— Amygd., Anethi, Anisi, Aurant., Amar., Aurant. Flor., Carui, Caryoph., Cinnam., Fœniculi, Lavand., Limonis, Menth. Pip., Menth. Vir., Myrist., Pimentæ, Pini. Rosæ. Sassaf., Thymi, Vanillæ.		445
Symphytum var.	.. ..	862
Synergism	.. .. ..	561
Synol Soap	.. .. ..	737
Synthetic Cocaine to be included (?) as Dangerous Drug—League of Nations. P.J. ii/24,352.		
Syphilis	.. .. 204, 459, Vol. II.	
,, Arsenic & Mercury comb. treatment	..	212
,, Diagnosis Methods		Vol. II.
,, Salvarsan in	.. 204 *et seq.*	
,, War Office Treatment		212
Syringes	.. 284 & 285,	461
Syrupus	.. .. ..	733
,, Acaciæ	.. .. ..	1
,, *Acid Hydriodic*, 30 to 60 m.		512
,, Aegle Marmelos Co., ½ to 1 oz.	.. .. ..	816
,, Apomorph. HCl., ½ to 1 dr.		183
,, *Aromat.*, ½ to 1 dr.	..	
,, *Aurantii*, ½ to 1dr.	..	232
,, Benzaldehydi Hydrocyanicus, ½ to 1 dr.	..	851
,, Bromoformi, ¼ to 1 oz.	..	259
,, Calcii et Fe. Lactoph., ½ to 1 dr.	..	68
,, ,, *Lactoph.* ½ to 1 dr.		68
,, Camph. Co., 1 dr.	..	631
,, *Cascaræ Aromat.*, ½–2 dr.		289
,, *Chloral*, ½ to 2 dr.	.. ..	296
,, Cocainæ, 1 dr.	.. ..	346
,, Cocillanæ Co., ½ to 1 dr.		824
,, *Codeinæ Phosph.*, ½ to 2 dr.		362
,, Cyllin, 10 to 60 m.	..	36
,, Digitoxin, 1 to 4 dr.	..	412
,, Dusart, 2 to 4 dr.	..	68
,, Eastoni, ½ to 1 dr.	431,	432
,, ,, Liq. pro., 9–18 m.	..	431
,, Eucalypti Gum ½–1 dr.	..	828
,, Ferri Brom., ½ to 1 dr.	..	430
,, ,, et Quin. Cit., 1 dr.		710
,, ,, *Iodidi*, ½ to 1 dr.	..	429
Syrupus Ferri Phosph., ½ to 1 dr.		430
,, ,, Phosph. Co., ½ to 2 dr.	.. ..	430
,, ,, *Phosph. c. Quin et Strych.* ('Easton'), ½ to 1 dr.	..	431
,, Ficorum, 1 to 4 dr.	..	413
,, Formatum Co., 1–2 dr.	.	40
,, *Glucosi*	.. .. ..	682
,, *Glyceroph.* Robin, 1 to 4 dr.	.. ..	47
,, ,, Co., 1 to 2 dr.	..	47
,, ,, c. Format., 1 dr.	..	47
,, Heroin, 1 to 2 dr.	..	559
,, Hypoph., 2 dr.	..	679
,, ,, Co., ½ to 2 dr.	..	679
,, ,, Fellows', 1 to 2 dr.		679
,, Iodo-Tannic, ½–2 dr.	..	505
,, Ipecac.	.. .. ..	515
,, Kolæ Co., 1 to 2 dr.	..	266
,, Lactucarii. av. 2 dr.	..	493
,, *Limonis*, ½ to 1 dr.	..	840
,, Mori, 1 dr.	.. ..	843
,, Neurotonique, 2 to 3 dr.		710
,, Picis Liq., 1 to 2 dr.	..	690
,, ,, c. Codeina, ½ to 2 dr.		690
,, Pilocarpin et Pot. Brom., 1 dr. to 1 oz.	..	533
,, Pini Pumil., 1 dr.	..	687
,, Pini Terpin et Heroin, 1 dr.		687
,, *Pruni Virg.*, ½ to 1 dr.	..	851
,, Rami, acc. to age	..	259
,, Rhamni, ½ to 1 dr.	..	830
,, *Rhei.*, ½ to 2 dr.		853
,, ,, Aromat., av. 2 dr.	..	853
,, *Rosæ*, ½ to 1 dr.	..	854
,, *Scillæ* (& Co.), 30 to 60 m.	.. ..	857
,, Senegæ, 1 dr.	.. ..	858
,, *Sennæ*, ½ to 2 dr.	..	858
,, Sulphatum, 4 dr.	..	276
,, Tann-Iodo-phosph., ½ to 2 dr.	.. .. ..	506
,, Thymi, 1 to 4 dr.	..	864
,, *Tolu.*, ½ to 1 dr.	..	815
,, Triplex, 1 to 2 dr.	..	432
,, Trium Phosph., ½ to 1 dr.		431
,, *Urginæ*, ½ to 1 dr.	..	864
,, Violæ, *ad lib.*	.. ..	866
,, *Zingib.*, ½ to 1 dr.	..	868
Sys Specific	.. .. ..	267
Sysimbrium, 828; Systogen	..	419
T. A. B. Vaccine	.. ..	930
T.C.P.'	 80,	525
T.N.T.	.. ..	327
Tabaci Folia	.. .. ..	845
Tabaiaco	.. .. ..	625
TABELLÆ, Chocolate Tablets		778
,, Antiasthmat., 1 to 4 *t.d.*		572
,, Antimonii Sulph. (0.01Gm.)		170
,, Apomorph., 1/100, 1/50 gr.		183
,, Bismuthi et Pepsin, *aa.* 3 gr.	.. ..	243,661
,, ,, ,, c. Cascara Ext., 1 gr.,	....	243

NAME.	DOSE.	PAGE
Tabellæ—*contd.*		
,, Caffeinæ Cit., 1 gr.		263
,, Cocainæ, 1/20 to ⅛ gr.	..	346
,, Diacetyl Morph. HCl., 1/10 gr.	.. .. ..	559
,, Digitalin, 1/10 gr., et Nitroglycerin, 1/100 gr.		412
,, Erythrol Nitratis, ⅛, ¼, ½, 1 gr., 1 or 2	..	421
,, Exalgin, ½ gr.	.. ..	4
,, *Glonoini*, 1/130 gr.	..	571
,, Lecithin, ½ gr.	.. ..	535
,, Mannitol Nit., 1 gr.	..	421
,, Menthol, 1/5 gr.	..	551
,, Nitroglycerini 1/600, 1/400, 1/200, 1/100, 1/75, 1/50. 1/25 gr. and 1 mgr. 1 or 2	..	571
,, Nitroglyc., 1/100 gr. c. Caffeine, 1 gr.	..	572
,, Nitroglyc. Sod. Iod. c. Arsen...	.. ..	572
,, Nitroglyc. 1/150 to 1/100		
,, Strych., 1/100 to 1/20		572
,, Nitroglyc., 1/200 to 1/100		
,, Thyroid., ½ to 3 gr.		572
,, Nitroglyc. Co., 1 or 2	..	572
,, Papain, 2 gr.	.. ..	650
,, Pepsinæ, 3 gr.	..	661
,, ,, et Caffeine, 1 to 2	..	661
,, ,, et Strychinnæ	..	661
,, Phenolphthalein, ½, 2 and 4 gr.	.. .. ..	673
,, Phenolph., 4 gr., c. Ext. Rhei, 3 gr.	.. ..	673
,, Quin Tannat., 1 gr.	..	728
,, Sodii Nitritis et Sodii Iodidi	.. ..	750
,, Sodii Nitritis Co.	..	750
,, Strophanthi Tinct., 2 m.		764
,, Suprarena. Ext., ½ gr.	..	959
,, Trilactine..	.. ..	69
,, *Trinitrini*, 1-130 gr.	..	572
Tablets, Compressed—Tablettæ, 775. *In demand are* :—		
Acetanilide, 3 gr., et c. Caffeine, 1 gr.	.. ..	3
Aceto-Salicyl. Acid. 5, 8 gr. (and with Phenacetin also with Dover Pdr.)	..	88
Ac. Benzoic Co. = Benzoic Acid, ½; Codeine, 1-10; Ipecac., 1/10; Menthol, 1/10; Red Gum, ½ g .		
Acid Lactic Bacilli, 3 to 6 *p.d.*		69
Aconiti = 2½ m. Tincture	..	109
Adalin, 5 gr.	.. ..	793
Adrenalin, 1/200 gr.	..	963
,, 1/300 gr., with Cocaine ⅙ gr.	.. .. ..	964
Alkagen, 1 to 3	.. ..	539
Aloes et Ferri, 4 gr.	..	149
Aloin, 1/10 and ½ gr.	..	151
,, Compound	.. ..	151
Alopon, ⅙ gr.	.. ..	632

NAME.	DOSE.	PAGE
Tablets, Compressed, *contd.*		
Alypin, ⅓ 5/6 and 3½ gr. (and ⅓ c. Suprarenin)	.. ..	352
Ammon. Brom., 5 and 10 gr.		156
,, Chlor., 3 and 5 gr.	..	157
,, ,, 3 c. Borax, 2 gr.	..	157
,, ,, c. Glyc. Ext., 3 gr.		157
,, Quinine and Comp.	..	726
Anticonstipation	.. ..	151
Antifebrin, 3 gr. (et c. Caffeine, 1 gr.)	.. ..	3
Antipyrine, 2½ and 5 gr. (et 3 gr. c. Caffeine, 1 gr.)	..	335
Antiseptic (Thymol, etc.)	..	
Antityphoid	.. ..	753
Apomorphine, 1/100, 1/50 gr.		183
Arsamin, 1 gr.	.. ..	202
Arsenic, 1/60 gr. ..		
Iron Hypoph., 2 gr.		194
Quin. Ac. Sulph., 1 gr.		
Arsenious Acid, 1/100, 1/50, 1/20 gr.	.. ..	191
,, 1/64 gr., with Mercuric Chloride, 1/64 gr.		193
Aspirin, 5 and 8 gr., and with Phenacetin, 2½ gr., and with Dover's Pdr.	..	88
Aspriodine, 5 gr.,	.. ..	97
Atrop. Sulph., 1/100 gr.	..	227
Benzonaphthol, 5 gr.	..	565
Benzosol, 5 gr.	.. ..	398
Betanaphthol, 3 and 5 gr.	..	564
,, 5 grains, c. Phenolphthalein, 3 gr.	..	564
Bismuth Carb., 5 gr.	..	240
,, Salicyl., 5 gr.	..	245
,, Subnit., 5 and 10 gr.	..	248
,, et Pepsin, *aa* 3 gr.	..	243
,, Pepsin & Cascara, one *t.d.*	.. .. ..	243
,, Pepsin and Charcoal, 2 gr. each	.. ..	—
Blaud's Pill, 4 and 8 gr.	..	424
,, ,, 4gr. c. Arsen. 1/64 gr.		194
Bon Voyage	.. .. ..	48
Boric, Acid, 5 gr.	.. ..	11
Brominol = 9 gr. Pot. Brom.		258
Bromural, 5 gr.	.. ..	794
Butyl-Chloral c. Gelsem.	..	260
Caffeine, 1 gr. c. Antipyrin, 3 gr.	.. .. ..	263
,, Cit., 2 gr.	.. ..	263
,, HBr., 2 gr.	.. ..	263
,, ,, 1 gr., c. Phenacetin, 4 gr.	.. ..	263
Calc. Lact., 5 gr.	.. ..	67
Calc. Sulph., ¼, ½, 1 gr.	..	275
Calomel, 1/10 to 5 gr.	..	479
Calcusol	.. .. ..	689
Camphor, ¼ gr. ..		279
Quin. Ac. Sulph., 1 gr.		
Camph. Monobr., 1 gr.	..	279
Cannabis = 5 m. Tinct.	..	280
Carbolic Acid, ¼, ½ gr.	..	18
Cascara Ext., 1 to 5 gr.	..	290

NAME. DOSE.	PAGE
TABLETS—*contd.*	
Catha Ext., 2½ gr.	291
Cerebral, 5 gr.	945
Chinosol, 5, 8, 15 gr. ..	327
Cinchonidine Sulph., 5 gr. ..	707
Choralamide, 5 gr. ..	297
Chloral Hyd., 5 and 10 gr. (*to be dissolved*)	296
Cholelysin, 736; Chologen ..	694
Codeine, Phosph., ¼ gr. and ½ gr.	362
Codeonal, 2½ gr. ..	562
Colalin, ⅛ and ½ gr. ..	757
,, Laxative, 1⅛ gr. ..	757
Col. Co. = 4 gr. pill. (*Off.*) ..	
Comp. Hypophosphites ..	679
Cotarnin HCl., ¾ gr. ..	567
,, Phthalate, ¾ gr. ..	567
Corpus Luteum, 1 gr. ..	946
Cystazol, 10 gr.	458
Cystoformin, 15 gr... ..	459
Dial, 1½ gr.	795
Didymin, 5 gr.	965
Digitoxin, 1/250 gr. ..	412
Dinner, 694; Diuretin, 5 gr.	779
Dormigene, 5 gr.	794
Dover's Powder, 5 gr. ..	515
Duodenal Ext. = 5 gr. ..	946
Easton Syrup = ½ & 1 dr. (& c. Arsen.)	432
Effervescing, *see* 'Vescettes.'	
Ergotin, 1, 2 and 3 gr. ..	417
,, Senecin Co.	417
Eserine and Trunecek's Serum	682
Eucaine-*β*, 1/10 gr. ..	351
Euonymin, 1/6 to 4 gr. ..	422
Euquinine, 8 gr.	728
Exalgine, ½ gr.	4
Ext.-Filicis, 3 m.	435
Fæxin Ext., 3 gr.	293
Ferri Arsenas, ⅛ gr. ..	195
Ferri (Blaud), with Arsen. 1/64 gr.	194
Ferri Carb., Sacch., 5 gr. .	424
,, Quin. Citr., 3 gr. ..	710
Ferro-Sajodin, 7½ gr. ..	513
Ferrum Redactum, 2 gr. ..	424
Formaldehyde Disinfectant	139
,, ¼ gr. c Sacch., Lact., 2gr.	140
Formamint	140
Gland ('Three' and 'Four'), 1 or 2 969,	970
Glyceroph. Co.	47
Grey Powder, ½ to 3 gr. ..	—
Grey Powder, 1 gr., and Dover's Powder, 1 gr. .	—
Guaiacol Benz., 5 gr. ..	398
,, Carb., 5 gr.	398
Guaiac. & Sulph., *aa* 3 gr. ..	453
Halazone	64
Hexamin, 5 gr.	457
,, & Lith. Benz. ..	458
Hyd. Iodid. Flav., ⅛ gr. .	470
,, ,, Vir., ⅛ gr. ..	470

NAME. DOSE.	PAGE
TABLETS—*contd.*	
Hyd. Perchlor., 1/100, 1/32, 1/16 & 1/10 gr. ..	476
,, Subchlor., 1/10, ⅛, ¼, ½, 1, 2, 3, 4, and 5 gr.	479
Hydrastine Compound ..	484
Hypoph. Co.	679
Ichthyol, 2½ gr.	495
Iodinol, 3 gr. of 25% ..	504
Iodoprotein, 10 gr. ..	512
Iodostarin	513
Ipecac,. 1/20, 1/10, ¼, 5 gr. ..	514
,, Alcresta, 10 gr. ..	531
Iron Carb. Sacch., 5 gr. ..	424
Iron Quin. Cit., 3 gr. ..	710
Kermetis, 0.01 Gm. ..	170
Lactic Acid Bacilli, 6 *p.d.* ..	69
Lactobacilline	69
Lactobac-Glycogen	70
Laverain	729
Lecithin, 1½ gr.	535
Lithium Carb., 5 gr. ..	537
,, Citrate, 5 gr.	537
Livingstone Rousers ..	727
Lymphatic Gland	948
Magnes. Perox.	487
Magnes. Sulphis, 5 gr. ..	105
Malonurea, 5, 8, 10 gr. ..	791
Manganese Diox., 2 gr. ..	545
Marienbad	151
,, Salt, and Anti-obesity	754
Mixed Gland..	970
Migralgin, 8 & 15 gr. ..	266
Mucin, 5 gr.	948
Nitroglycerin, —1/50 gr. / Sodi. Iodid., 15 gr. / Liq. Arsenical, 2 m. .. } 4*tis horis* ..	572
(*See also* Tabellæ, 571 *et. seq.*)	
Nitropropiol (Sugar Test)	Vol. II.
Novocain with Adrenalin var.	353
Nuclein, 1 gr.	293
Omnopon, 1/6 gr.	633
Opium, ½, 1 gr.	630
Orchitic Subst., 5 gr. ..	965
Ovarian, 5 gr.	948
Ox Bile (Stearettes), 5 gr. ..	423
Pancreatin and Soda ..	638
Papain, 2 and 5 gr. ..	650
Paraform	139
Parathyroid, 1/20, 1/6, ¼, ½ gr.	973
Pavimol, 5 m.	620
Pepsin, 3 gr.	661
,, 3 gr. et Caffeine, 2 gr.	661
Peptonic (Pepsin, Pancreatin, Calcium Lactoph., each 1 gr.)	
Phenacetin, 4, 5 & 10 gr. ..	333
,, 4 gr., c. with Caff., 1 gr.	333
,, 2½ gr., and Sulphonal, 2½ gr.	333
Phenalgin, 5 gr.	4
Phenolphthalein, ½, 2, 4, gr.	673
,, Comp.	673
Phenoquin, 4 gr.	328
Phenyl-Aspriodine, 5 gr. ..	100
Phenyl-Sedasprin, 5 gr. ..	101

NAME. DOSE.	PAGE
TABLETS—*contd.*	
Pichi Ext. and Comp. ..	849
Pilocarpin Nit., 1/10, 1/5 gr.	533
Piperazine, 5 gr.	689
Pituitary Dried, 1 gr. entire gland	952
Placenta=0·25 gm.	Vol. II.
Podoph., 1/4 to 1 gr. ..	693
Potass. Bicarb., 5 gr. ..	—
,, Brom., 5, 10 gr. ..	696
,, Chlor., 5 gr.	697
,, ,, 3 gr., c. Ammon. Chlor. 1 gr., c. Borax, 2 gr. et c. Borac. et Cocaina..	697
Pot. Iodide, 5 gr. ..	700
,, Permang., 1, 2, 3 gr. ..	548
Proflavine, 1.75 gr. ..	319
Proponal, 1½ gr.	794
Pulv. Cret. Arom. c. Op., 5 gr.	630
Quin. Acetyl-Salicyl., 3 gr.	719
,, Ethyl-Carb., 8 gr. ..	728
,, HBr. 3 and 5 gr. ..	711
,, ,, 3 gr. c. Phenac., 5 gr	711
,, HCl., 1 to 5 gr. ..	712
,, ,, Acid, 1, 3, 5 gr. ..	717
,, Rhei Co.	727
,, Salicyl., 3 gr. ..	719
,, Sulph., 1 to 5 gr. ..	724
,, ,, Acid, ½ to 5 gr. ..	727
,, ,, Ac. 1 gr. c. Camph., ¼ gr.	279
,, ,, Ac. 1 gr. Camph. 1/5 gr. et c. Aconite Tintc., 1 m. ..	726
,, ,, Camph., Morph. et Atrop. ..	726
Red Bone Marrow, 3 gr. ..	944
Regenerative, 6 *per diem* ..	744
Rennet, 659; Rennin, 1 gr...	659
Resorcin, 3 gr.	730
Rhubarb, Soda and Ginger..	853
Saccharin, ½ gr. ..	732
Salicin, 5 gr.	94
Salipyrin, 5 gr.	336
Salol, 5 gr., 94; Salophen, 5 gr.	101
Santalol, 3 m.	622
Santonin, 1, 2 & 3 gr. ..	735
Sedasprin, 5 gr.	98
Sidonal, New, 7½ gr. each ..	689
Soda Mint (Sod. Bicarb., Am. Carb., & Mint). *For Effervescing Compounds see* 'Vescettes.'	
Sodii Acid Sulph.	753
,, Arsenat Co.	197
,, Benzoate, 2 gr. ..	10
,, Bicarb., 5 gr. ..	—
,, Bisulph. for Baths ..	753
,, Bromid., 5 gr. ..	745
,, Chlor. et Borac ..	748
,, Citras. 5 & 10 gr.	581, 748
,, Desoxycholate ..	757
,, Iodid. c. Sodii Nitrite, 3 gr. with ½ gr., also 5 gr. with 1 gr. ..	750

NAME. DOSE.	PAGE
TABLETS—*contd.*	
Sodii Nitris, 2½ gr. and Co.	750
,, Perborate Mouth ..	15
,, Salicyl., 3 & 5 gr., and Nascent	85
Solurol, 4 gr.	967
Spinal Cord, 2½ gr. ..	945
Stannoxyl	860
Starch, Paraff., *c.t.d.* ..	69
Strontium Brom., 5 gr. ..	762
Strophant. Tinct., 2 & 5 m.	764
Strych. Sulph., 1-60 to 1-30 gr.	767
Strych. c. Nitroglyc. (Tabellæ)	572
Stypticin, ¾ gr.	567
Styptol, ¾ gr.	567
Sulphonal, 5 gr.	769
Sulph. Præcip., 5 gr., c. Pot. Acid. Tart., 1 gr. ..	771
Supra-renal, ½ & 1 gr. Dry Substance	959
Syr. Easton=½ & 1 dr. ..	432
Testicular Substance ..	965
Theobrom. Sod. Salicyl, 5 gr.	779
Theocin Sod. Acet., 4 gr. ..	780
Theophylline, 4 gr. ..	780
Thiocol, 5 gr.	399
Three Gland	970
Thyminic Acid, 4 gr. ..	967
Thymoform	785
Thymol Carb., 10 gr. ..	785
Thymus Gland, 3 & 5 gr. ..	966
Thyroid (Standard), 1½ & 5 gr.	969
,, Comp. (3 & 4 gland)	969, 970
Tinct. Aconit., 2½ m. ..	109
,, Bellad., 2 & 5 m. ..	239
,, Cannab=5 m. ..	280
,, Nuc. Vom., 5, 10 m. ..	599
,, Opii, 5 & 10 m. ..	631
,, Quin. Ammon.=1 dr.	726
,, ,, ,, Comp. ..	726
,, Strophanth, 2 & 5 m...	764
Trilactine, 3 to 6 *p.d.* ..	69
,, Intestinal, 3 to 6 *p.d.*...	69
Trional, 5 gr.	769
Trivalin	798
Trunecek's Serum	744
Tylcalsin, 8 gr.	90
Tyllithin, 8 gr.	92
Tylmarin, 5 gr.	32
Urethane, 5 gr.	796
Urotropine, 3, 5, & 7½ gr.; Eff., 5 gr.	456
Varium	948
Veronal, 5, 5, and 10 gr. ..	791
Vesalvine, 5 gr.	457
,, 'S' 5 gr.	458
Water Sterilising	753
YohimbineHCl., 1/13 gr. ..	867
Zinc Oxide, 2 gr.	800
Tablets, Hypodermic ..	776
Chiefly in demand are:—	
Aconitine Nit., 1/640 gr. ..	110
Adrenalin, 1/300 gr., c. Cocaine HCl., ⅛ gr. ..	964
Adrovaine (Adrenalin 1/250 c. Stovaine, ⅛ gr.) ..	964

NAME. DOSE. PAGE

TABS. HYPOD.—*contd.*
Apomorph. HCl., 1/20, 1/15, 1/10 gr. 183
Atrop. Sulph.,1/200 to 1/50gr. 228
Atrop. c. Morph. 228
Butyn, ⅛ gr. 359
Caffeine Sod. Salicyl., ½ gr... 264
Cocaine Hyd., 1/10–½ gr. .. 345
Codeine Phosph., ¼ and ½ gr. 362
Curare, 1/12 gr. 825
Diamorphine HCl.,1/24, 1/12 gr. 559
Digalen 412
Digitalin, 1/10 gr. 412
Ergamine, 1/65 gr. 418
Ergotinine Cit.,1/200 to 1/100 gr. 418
Ergotoxine, 1/100 gr. .. 418
,, 1/100 c. Morph. ⅛ .. 418
,, 1/100 c. Strych., 1/20 418
Heroin HCl., 1/24, 1/12 gr... 559
Homatropine HBr.,1/200 gr. 231
Hyd. Perchlor., 1/60, 1/50, & 1/30 gr. 476
Hyoscine HBr., 1/400 to 1/75 gr. 490
Hyoscine Comp. 491
Hyoscyamine Sulph., 1/100, 1/50 gr. 493
Morphinæ mec., ⅛ and ¼ gr. 556
,, HCl., ⅛ to 1 gr. .. 556
,, Hypophosph, ¼, ⅛, ½ & 1 gr. 556
,, Sulph., ⅛ to 1 gr. .. 557
,, c. Atropina .. 557
,, c. Nitroglycerin .. 557
Nitroglycerin, 1/100 & 1/250 gr. 570
Novocain and Adrenalin .. 353
Physostig. Salicyl., 1/500 gr. 681
Picrotoxin, 1/100 gr. .. —
Pilocarpine HCl., ⅛ gr. .. 532
,, Nit., 1/10 to ½ gr. .. 533
Quinine HBr., ½ gr. .. 711
,, HCl. Acid, 1, 2, and 3 gr. 717
Sclerotic Acid 1/16 gr. .. 420
Scopolam. Morph. (and with Atrop.) 491
Sparteine Sulph., ½ gr. .. 757
Strophanthin, 1/500 gr. .. 764
Strychnine Nit., and Sulph. 1/100 to 1/30 gr. .. 767
Tropacocaine HCl., 1 30 gr. 350
Tyramine 419
Tablets, Ophthalmic. *Vide* Lamellæ.
Tablet Triturates 776
Tablogestin, 3 Tabs. 641
Tachiol, 187 ; Tænia, 435 ; 734, —— ; and Worms,Therap.Ind.
Taffetas Film 447
Taka-diastase, 1 to 5 gr. .. 544
Talc (and Talc. Purif.) .. 156
Tallquist Scale .. Vol. II.

NAME. DOSE. PAGE
Tamarind, 1 to 8 dr. .. 863
Tambach's Test 106
Tampons, Gauze .. 442, 774
Tamus, 863 ; Tanacetum .. 863
Tannalbin, 8 to 15 gr. .. 106
Tannal Insolubile 106
Tannigen, 5 to 15 gr. .. 107
Tannin, 5 to 10 gr. .. 105
Tannoform 107
Tanret's Reagent .. Vol. II.
Tansy, 863 ; Tapioca Starch, 811 ; *Tar*, 2 to 10 gr. .. 689
Tar Acids, 34 ; Oils 34
Tar Spirit 690
Taraktogenos 606
Taraxacum (30 to 120 gr.) .. 863
,, Cocoa, ½ oz. 863
Tartar Emetic 174
Diaphoretic, 1/24 to ⅛ gr.
Emetic, ½ to 1 gr.
Tartarus Boraxat, 20 to 40 gr. 14
'Tartro-Bi' 254
Tartro Bismuthates 251
Tatcho .. .. Vol. II.
Tattoo Marks to Remove .. 1056
Taxine, 1/100 to 1/60 gr. .. 863
Tea, 262 ; Tea Seed Oil Vol II.
Teale on pathogenicity of bacteria 871
Teel Oil 625
Teeth Infection 910
Teinture de Badiane 814
Teinture de Camph. Conc.and faible 277
Teinture d'Iode Fr. Cx., 1908 506
,, ,, Officinale .. 507
Teintures var. *vide* Tinct. ..
Tellurium Organic Comps. bactericidal action.–G. T. Morgan v. C.D., Sept. 27/24,444.
Tenaline 813
Tephrosia 830
Terebenum, 5 to 15 m. .. 776
Tereb. Canad .. .. Vol. II.
,, Chia, 5 to 10 gr. .. 863
Terpenes .. .. Vol. II.
Terpineol and Terpilenol .. 777
Terpinol, 1 to 5 m. 777
Terpine, Terpin. Hydrat., 2 to 6 gr. 777
Terra Alba 155 : Testis .. 965
Testiculin, 15 to 30 m. .. 965
Testogan 966
Tetanus Antitoxin, 3000 to 8000 units intraspinally and 9000 to 16000 intravenously. (Proph., 500 to 1000 units subcut.), 911 ; Immunity Units, 913 ; Dried Serum, 912 ; Mag. Sulph. Injection, 541 ; Intracerebral, 912, 913 ; Preparation, 913; Quinine in relation 913 ; Veterinary Use, 913 ; War

NAME.	DOSE.	PAGE.
Off. Memo, 912; Wound Dressing, 911, 913; Anaphyl. Shock, 912, 914; Passive Immunity	.. ..	913
Tethelin	.. .. ..	953
Tetrabromfluorescein	..	Vol. II.
Tetrachlorethane	..	306, 451
Tetrachlorethylene	.. ..	306
Tetra-ethyl diamino-triphenyl-carbinol	.. .. ..	329
Tetraiodo-eosin	..	Vol. II.
Tetramethyl-diarsine	.. ..	198
Tetra-iodo-pyrrol, 1 to 3 gr.	..	501
Tetranitro-methyl-aniline	..	320
Tetra-oxy-diphosphamido-di-arseno-benzene	.. ..	222
Tetra-oxy-phthalophenon	..	673
Tetra Vaccine	.. .. ..	931
Tetryl	.. ..	320
Teucrium	.. .. ..	863
Texas Fever	.. .. ..	203
Thalleioquin	.. .. ..	709
Thallium Acet	.. ..	Vol. II.
Thaolaxine	.. .. ..	807
Theine, 1 to 5 gr.	.. ..	262
Thelygan	.. .. ..	966
Theobrom Ol.; Pasta	778&	Vol. II.
Theobromine, 1 to 5 gr., 262, 778 &		Vol. II.
,, Aceto-Salicyl., 1 to 5 gr.		779
,, *Sodium-Sal.*, 10 to 20 gr.		779
,, Sodio Acet., 10 to 15 gr.		778
,, Sodio Form, 8 to 15 gr.		779
,, Sodio Iod., 8 to 15 gr.	..	780
,, -Iodo-Sal. 2 to 10 gr.	..	780
Theocin, 3 to 6 gr.	.. ..	780
,, Sodium Acetate, 2 to 4 gr.		780
Theophylline, 3 to 6 gr.	..	780
,' Sod. Acet., 2 to 4 gr.	..	780
Theo-Sodo-Form., 8 to 15 gr.	..	779
Theo-Sodo-Sal., 10 to 20 gr.	..	779
Theo-Sodo-Acet., 10 to 15 gr.		778
'Therapeutic Coefficient'	..	315
Therapeutic Index	.. ..	1005
Thermiol, 30; Thermofuge, 443; Thermolaine, 448; Thermo-Isolators	.. ..	Vol. II.
Thermit	.. .. ..	154
Thermometric Equivs.		Vol. II.
Thermos Flasks	..	Vol. II.
Thialion, 1 dr.	.. ..	538
Thieleman's Drops, av. 30 m.		392
Thigenol, 496; Thio-carbamide, 789; Thiocol, 15 gr.	..	399
Thiodin	.. .. ..	740
Thiodotoxyl	.. .. ..	741
Thionin Solution	..	Vol. II.
Thio-Resorcin	.. .. ..	732
Thiosinamin, ½ gr. inc. to 2 gr. (and Mull.)	.. ..	739
,, Eth. Iodide (Inj.), 3 gr.	..	740
Thio-Urea	.. .. ..	789
Thomson's Vaccines	.. ..	942
"Thoriac"	.. .. ..	781
Thorii Aceto Coumaras, 32; Camph.-Sulphonas, Cinnam., 781; Chloridum, 781; Glycerophosphas, 782; Hydroxidum, Nitras, 781; Ortho-Coum., 781; Lactas, 782; Oleas, 782; Oxidum, 781; Phthalas, 782; Quinas, Salicyl, 782; Sodio-Citras, Vol. II.; Sulphas, 781; Sulphocarb., etc.	.. .. ..	782
Thorium	..	780 *et seq.*
,, Pads	.. .. ..	781
,, Radio Products		Vol. II.
Thorn-Apple	.. .. ..	761
Threadworm (and Therap. Index).	.. .. ..	734
Three Gland Tabs.	.. ..	970
Thromboplastin	.. ..	945
Thresh's Reagent	..	Vol. II.
Throphleol, 422; Thuja	..	864
Thus Americanum	.. ..	685
Thyme	.. .. ..	864
Thymaglycine, 10 to 30 m.	..	784
Thymobenzene	.. ..	177
Thymoform Tablets	.. ..	785
Thymol, ½ to 2 gr.; Anthelmintic, 15 to 30 gr.	..	782
,, Antiseptic power		Vol. II.
,, Carb., 5-15 gr.	..	435, 785
,, Disinfectant	.. ..	783
,, Iodide = Aristol	..	500
,, Sol. (Volckmann's)	..	785
,, Sulphonephthalein		Vol. II.
,, Wool & Gauze	.. ..	785
Thymophthalein	..	Vol. II.
Thymotal, 5 to 15 gr.	..	785
Thymus Gland (Liq. Ext., ½-2 dr.), 3-10 gr.	.. ..	966
Thymus Vulgaris	.. 782,	864
Thyro-glandin, 3 to 5 gr.	..	969
Thyroid Gland	.. 967 &	Vol. II.
,, B.M.R.	.. .. ..	973
,, "Extract"	.. ..	969
,, Historical Review	..	967
,, Overdose	.. ..	968
,, Activity Tests	.. ..	973
,, Solution, 5–15 m.	..	968
,, Tablets Standardised, 1½ and 5 gr.	.. ..	969
,, References	.. ..	971
,, Variation	..	Vol. II.
Thyroidectomised goat's milk		974
Thyroidectin, 5 gr.	.. ..	974
Thyroideum Siccum, ½–4 gr. 969; assay	.. ..	V. II.
Thyroxin	.. .. ..	968
Tick Fever	.. ..	Vol. II.
Tidman's Salt	.. .. ..	745
Tiki-Tiki, *see* Beri-Beri	..	Vol. II.
Tiliæ Flores, Tilleul	.. ..	497
Tillman's Dressing	.. ..	449
Tin, Tin Oxide	.. .. ..	860

NAME.	DOSE.	PAGE
Tinct. Aconiti,	2 to 5 m.	109
,,	,, (Fleming), 1 to 5 m.	109
,,	,, ,, et Iodi	110
,,	Actææ, 30 to 60 m.	823
,,	Adonis, 10 to 30 m.	806
,,	Æsculi Hippoc., 10 m.	806
,,	Aloes, 1½ to 2 dr., or ½ to 1 dr. rep.	150
,,	,, Co., 1 to 2 dr.	150
,,	*Alstoniæ*, ½ to 1 dr.	810
,,	Amara. P.G.	831
,,	Ananassæ Sativæ, 30 m.	811
,,	Anodyna, 5 to 30 m.	632
,,	Anthemidis, 3–10 m.	812
,,	Anthoxanthi, 2–6 m.	8 12
,,	Anticholerica	392
,,	,, Thielemani, av. 30 m.	392
,,	Antiperiodica, 1–4 dr.	726
,,	Apis, 1 m. hourly	812
,,	Apocyni Can., 5 to 60 m.	182
,,	Arnicæ, ½ to 1 dr.	
,,	,, *Flor.*, ½ to 1 dr.	813
	Aromatica = Tinct. Cinnam.	
,,	*Asafetidæ*, ½ to 1 dr.	813
,,	*Aurantii*, ½ to 1 dr.	232
,,	Avenæ, 20 m.	814
,,	Baptisiæ, 5 to 30 m.	815
,,	*Bellad.*, 5 to 15 m.	238
,,	*Benzoini*, Co., ½ o 1 dr.	8
,,	,, Simp.	9
,,	*Berberid.*, ½ to 1 dr.	816
,,	Boldoæ, 10 to 20 m.	816
,,	Bryoniæ, 1 to 10 m.	81 6
,,	*Buchu*, ½ to 1 dr.	260
,,	Cacti-Grandif., 2–10 m.	821
,,	Calendulæ Flor., 5 to 20 m.	817
,,	*Calumbæ*, ½ to 1 dr.	817
,,	*Camph.* Co., 30–60 m.	630
,,	*Cannabis Ind.*, 5–15 m.	280
,,	*Cantharidini*, 2 to 5 m.	283
,,	*Capsici*, 5 to 15 m.	287
,,	,, Æther	287
,,	,, Fortior 1 to 3 m.	287
,,	Cardam. & Co., ½ to 1 dr.	819
,,	Carminativa, 2–10 m.	868
,,	Caryophylli, 2 to 10 m.	820
,,	Cascara Sag., 10 to 60 m.	290
,,	*Cascarillæ*, ½ to 1 dr.	820
,,	Castorei, ½ to 1 dr.	820
,,	*Catechu*, ½ to 1 dr.	820
,,	*Chiratæ*, ½ to 1 dr.	823
,,	Chlorof. Co., 5–60 m.	305
,,	,, et Morph. B.P. 85, 5 to 10 m.	305
,,	,, *et Morphinæ Co.*, 5 15 m.	305
	Cimicifugæ, 30–60 m.	823
,,	*Cinchonæ* and *Co.*, ½ to 1 dr.	310
,,	*Cinnamomi*, ½ to 1 dr.	310
,,	,, Co., 20 to 40 m.	310
,,	*Cocci*, 5 to 15 m.	819
,,	*Colchici Sem.*, 5–15 m.	362
,,	Collinsoniæ, ½–2 dr.	824

NAME.	DOSE.	PAGE
Tinct.	Colocynth, 3–15 m	390
,,	Condurango, ½ to 1 oz.	824
,,	Conii, 30 to 60 m.	391
,,	Convallar, 5–20 m.	824
,,	Coronillæ, 30–60 m.	825
,,	Coto, 10 to 30 m.	392
,,	Croci, 5 to 15 m. (B.P. '98).	
,,	*Cubebæ*, ½ to 1 dr.	399
,,	Cudbear	Vol. II.
,,	*Digitalis*, 5 to 15 m.	409 & Vol. II.
,,	,, Assay of	409 & Vol. II
,,	,, Fol. Recent., 5 to 15 m.	410
,,	,, Sem.	Vol. II.
,,	,, Keeping Properties of	409 & Vol. II.
,,	,, Phys. Standardised	409 & Vol. II.
,,	Droseræ, 5 to 10 m.	827
,,	Elaterii Co., 10 to 30 m.	827
,,	Ergotæ, 5 to 30 m.	417
,,	,, *Amm.*, 30 to 60 m.	420
,,	Erythroph., 5 to 10 m.	422
,,	Eucalypti Fol., 15 to 120 m., 614; Gum, 20 to 40 m.	828
,,	Euonymi, 10 to 40 m.	423
,,	Euphorb. Pepli. 30 to 60 m. *in die*	829
,,	Euphorb. Pil., 10 to 30 m.	829
,,	*Ferri Perchlor.*, 5 to 15 m.	426
,,	,, Pomat., 15 to 30 m.	429
,,	,, Tart.	433
,,	Gallæ, ½ to 2 dr.	—
,,	Gambir Co., 1 dr.	820
,,	*Gelsemii*, 5 to 15 m.	437
,,	Gent. Amar.	831
,,	*Gent. Co.*, ½–1 dr.	—
,,	Gossypii Rad., 1 dr.	452
,,	Guaiaci, 1 in 10, 60 m.	454
,,	,, *Ammon.*, 30 to 60 m.	454
,,	Guaranæ, 30 to 60 m.	833
,,	Hæmostyptica, 5 to 30 m.	417
,,	*Hamam*, 30 to 60 m.	455
,,	*Hydrastis*, 30 to 60 m.	485
,,	*Hyoscy.* 30 to 60 m.	492
,,	Ignatiæ, 3 to 20 m.	600
,,	*Iodi Fortis*	504
,,	,, Churchill	507
,,	Fr. Cx. 1908 (*Sine Pot. Iod.*)	506
,,	,,Indian	506
,,	Iodinei, Ed.	507
,,	*Iodi Mitis*, 2 to 5 m.	506 *et seq.*
,,	,, et Aconiti	505
,,	,, Æther,. 510; Decol. and Decol. Fortis, 510; Oleosa	510
,,	Ipecac., 10 m.	515
,,	Iridis, 30 to 60 m.	836
,,	Ixoræ, 1 to 1½ dr.	836
,,	Jaborandi, 30 to 60 m.	532

NAME.	DOSE.	PAGE
Tinct. *Jalapæ (et Co.)*	30 to 60 m.	836
,, *Kaladanæ*	½ to 1 dr. ..	837
,, *Kino*	30 to 60 m. ..	838
,, Kolæ	20 to 60 m. ..	266
,, Koromiko	½ to 1 dr. ..	838
,, *Krameriæ*	30 to 60 m. ..	838
,, Lachnanthis	1 to 10 m	838
,, Lactucarii	av. 30 m. ..	493
,, Laricis	20 to 30 m. ..	—
,, Lasiosiphon	10 to 60 m.	839
,, *Lavand. Co.*	30 to 60 m.	—
,, Laxativa	20 to 60 m. ..	291
,, *Limonis*	30 to 60 m. ..	840
,, Lobeliæ	15 m. expt., 60 m. emetic.	840
,, *Lobeliæ Æther*	5 to 15 m.	840
,, Lupuli	30 to 60 m. ..	840
,, Lycopodii.	15 to 60 m. ..	840
,, Menthol Æther	.. ..	551
,, Monsoniæ	1 to 4 dr. ..	843
,, Moschi, U.S.	av. 1 dr. ..	843
,, *Myrrhæ*	30 to 60 m. ..	844
,, ,, et Boracis	.. ..	844
,, *Nucis Vom.*	5 to 15 m. ..	599
,, *Oliveri Cort.*	½ to 1 dr. ..	856
,, *Opii*	20 to 30 m.; 5 to 15 m. rep.	631
,, ,, *Ammon.*	30 to 60 m.	632
,, ,, Benz.	½–1 dr. ..	630
,, ,, Camph.	ab. 1 dr. ..	631
,, ,, Crocata	5 to 20 m. ..	632
,, ,, Deod.	av. 8 m. ..	632
,, Persionis	. ..	Vol. II.
,, Phosphori Co.	3 to 12 m.	677
,, Physostig.	5 to 15 m. ..	680
,, Phytolac	3 to 10 m. ..	849
,, *Picrorhizæ*	½ to 1 dr. ..	849
,, *Podophylli (et Indic)*	5 to 15 m.	694
,, ,, Ammon.	10 to 20 m.	694
,, *Pruni Virg.*	30 to 60 m.	851
,, Pulsatilla	5 to 30 m. ..	851
,, *Pyrethri* (& Co.)	. ..	852
,, *Quassiæ*	30 to 60 m. ..	852
,, Quebracho	30 to 60 m. ..	853
,, *Quillaiæ*	30 to 60 m. ..	853
,, *Quininæ*	30 to 60 m. ..	713
,, *Quininæ Am.*	30 to 60 m.	726
,, *Rhei Co.*	2 to 4 dr.; ½–1 dr. rep.	853
,, ,, Amara	½ to 2 dr. .	392
,, Rhei Aromat.	av. 30 m.	853
,, Rhois	2 to 15 m. ..	854
,, Rumicis	1 to 10 m. ..	855
,, Sanguinariæ	av. 15 m. .	855
,, *Scillæ*	5 to 15 m. ..	857
,, ,, Phys. Stand.	5 to 15 m.	857
,, Senecionis	1 to 2 dr. ..	858
,, *Senegæ*	30 to 60 m. ..	858
,, *Sennæ Co.* (Legum, 859)	2 to 4 dr.; ½-1 dr. rep.	859
,, *Serpentariæ*	30 to 60 m.	859
,, *Stramonii*	5 to 15 m. ..	761
,, *Strophanthi*	2 to 5 m. .	764
Tinct. *Strophanthi* Phys.	Standard	764 & Vol. II.
,, ,, Fraser's	.. ..	764
,, Sumbul	30 to 60 m. ..	862
,, Sydenham's	5 to 20 m.	632
,, Tami Communis	..	863
,, Thebaiaca	20 to 30 m.	631
,, Thujae	2 to 5 m. ..	864
,, *Tolutana*	30 to 60 m...	815
,, *Urgineae*	5 to 15 m. ..	864
,, Valerianæ	av. 1 dr. ..	797
,, ,, *Ammon .(et Indic.)*	½ to 1 dr. ..	797
,, Veratri Viridis	5 to 15 m.	865
,, Verbasci	20 to 60 m. ..	866
,, Viburn. Prunif.	2 to 4 dr.	866
,, Warburgii	1 to 4 dr. ..	726
,, Zedoari	60 to 120m. ..	726
,, *Zingib.*	30 to 60 m. ..	868
,, ,, Fort.	5 to 20 m. ..	868
Tincturæ, 786; Dispensing of		.. 786
Tincture of Life	. .. ..	784
Tinctures, Aqueous, Glycerin		.. 786
,, Ethereal, 786; *see* Tinct. Capsici = Æther, etc.		
,, Isopropyl	.. ..	131, 132
Tinea *v.* Therap. Index.		
Tiodine (injection, 3 gr)		.. 740
Tisane de Polygala, 858; various		497
Titanium	.. ..	Vol. II.
Toad Flax	.. .. ..	808
Tobacco	.. .. ..	845
Toison's Solution	..	Vol. II.
Tolamine	.. .. ..	60
Tolu	.. ..	815
Toluene Sodium Sulphone Chloramide, 60; acid of		.. 61
,, Sulphone Chloride		.. 60
,, Sulpho-dichloramide		.. 62
Toluidine, 321; Toluidine Blue.		Vol. II.
Toluol	.. ..	325
Toluol-azo-toluol-azo--B.Naphthol	.. ..	326
Tolysin	.. .. ..	327
Tonquin Bean	.. .. ..	32
Tonquinol	.. .. ..	327
Tooth Extraction	.. ..	343
,, Paste, 'Formosyl'	..	138
,, Pdr., Jungman's, 860; Sodium Perborate	..	14
Touch Wood, 810; Tow	..	449
Tournesol	.. ..	Vol. II.
Towels, Sanitary, 449; Moss	..	758
Town's Specific	.. .. ..	239
Townsend's Sarsaparilla		Vol. II.
Toxicophlœa, 806; Toxins 868 *et seq.*		
Toxol, 38; Trachylobium	..	841
Trade Marks, 1003; 'Avoided,' 1003; 'Suspended'		1003
,, ,, for Patented Articles		1003
,, ,, Act (1919)	.. ..	1004
Tragacantha, 2 to 10 gr.	..	786
Tragopogon	.. .. ..	864
Transfusion Apparatus, 209; Preps 742 *et seq.*		

NAME. DOSE.	PAGE.
Traumatic Balsam, ½ to 1 dr...	8
Traumaticin	308
Traumatol	501
Trepol	254
Treponema Pallid 207 &	Vol. II.
Trevanion Case..	792
Tri-acid Stain	Vol. II.
Tribondeau's Stains ..	Vol. II.
Tribromophenol, ½ to 2 gr.	22
,, Bismuth, 5 to 20 gr. ..	23
Tribrom-Tert.-Butyl. Alcohol..	259
Trichlorbuytl-Glycol, 5 to 20 gr.	260
Trichlorethyl. Glycol, 5 to 20 gr.	294
Trichlorethylene	306
Trichloromethane, 1 to 5 m. ..	297
Trichlorphenol	24
Trichlorphenyl-iodo-meth. Sal.	80
Trichlor-Tert.-Butyl-Alc., 5 gr.	261
Triferrin, 15 gr. *p.d.*	428
Trigemin, 12 gr.	336
Trigonella, 829 ;	
Tri-iodomethane	497
Trikresol	38
,, Formalin	39
Trilactine Ferment for injection, 69, 71,	895
Trilactine Milk	70
,, Tablets, 3 to 6 *p.d.* ..	69
,, ,, Intestinal . ..	69
Trillet's Method	372
Tri-methanal Allyl Carbide ..	139
Trimethol *c.f.* Dimol	
Trimethyl-Vinyl-Ammonium Hydroxide	7
Trimethylamine	843
Trimethyl Benzene	536
Trimethyl-Benzoxypiperidine, 1/10 to ½ gr.	350
Trimethyl-Glycocoll	7
Trimine, 8 to 15 m.	545
Trinitrin, 1/200 to 1/10 gr. ..	568
,, *Solution*, ½ to 2 m. ..	570
,, *Tabellæ*, 1/130 gr.. ..	572
Trinitrobenzol	323
Trinitrocellulose	364
Trinitroglycerin, 1/200to 1/10 gr.	568
Trinitrophenol	74
Trinitro-Butyl-Toluene . 327,	843
Trinitrotoluene	327
Triolein, Palmitin, Stearin	Vol. II.
Trional, 10 to 20 gr.	769
Triphenyl Antimon. Sulph. ..	181
Trioxymethylene	139
Tripanblue	203
Triple Valerianate Injection ..	798
Triticum.. 808,	811
Triturations	787
,, Acidi Arseniosi, 1/6 to ⅔ gr.	
,, Atropinæ Sulph., 1/20 to 1/10 gr.	
,, Cocainæ HCl., ½ to 5 gr.	
,, Ferri Arsenatis, ⅝ to 2½ gr.	
,, Morphinæ HCl., 1 to 3 gr.	
,, Picrotoxini, 1/10 to 2/5 gr.	

NAME DOSE	PAGE
Triturations Sodii Arsenatis, ¼ to 1 gr.	
,, Strophanthi (1 grain=10 minims Tinct. *Off.*), 1/5 to ½ gr...	
,, Strychninæ, ⅛ to ⅔ gr.	
Trivalin hypod., 8 to 15 m ; *per os* 8 m.	798
Trivalin c. Hyos. Valer. ' ..	798
Trochisci(Medicated Lozenges), F. with Fruit Paste, G. with gum basis *i.e.*, 'Pastils' or 'Jujubes'; S. with sugar, R. with Rose, T. with Tolu,—Bases ..	787
Acidi Benzoici, ½ gr., F. and 1½ gr. (Stimulant Voice), T.H. ½ gr..	9
,, Benzoici Co. T.H. (Benzoic Acid, Codeine, Cocaine, Ipecac., Menthol& Red Gum (marked C.B.A.)	
,, *Carbolici*, 1 gr., (S.) (marked C.A.)	21
,, *Tannici*, T., ½ gr. and G.,	
,, Tannici, F., 1½ gr., T.H.	
,, Tannici et Capsici, F.	
Aconiti, F., Tinct. ½ m. 1 every ½ hour	109
Adrenalin, 1/1000 gr. ..	964
Althææ (Guimauve) *ad. lib.*	
Ammonii Bromidi, 1 gr. (G.)	157
Ammon. Chlor., F. 2 gr. ..	157
,, ,, c. Glycyrrh., 3 gr.	157
Ammon. Chlor. Co. . ..	157
Antacidi (Sir W. Roberts) .. Calcii Carb., 3½ gr. Mag. Carb., 2½ gr. Sodii Chlor., 1 gr. ..	
Bismuthi Co., R., 2 gr. ..	
Boracis, F., 3 gr., T.H.	
Boracis et Potass. Chlor., F.	
Brompton Blacks	832
Camphoræ, 2 gr., S., *p.r.n.* ..	279
,, Salicyl. Comp. *t.d.* ..	279
Capsici, S., *p.r.n.*	
Carbonis, S., 12 gr., 1 or 2 *p.c.*	
Cascara gr., 2½ c. Menth. Pip. F., 1 or 2	291
Catechu. 1 gr., F., 2 gr. T.H.	820
Chlorodyne, 4 m., S., '85.	
Cocain. HCl. S., 1/12 gr., T.H. F., 1/10 (marked H.C.), G. 1/10, Brompt. ⅛	346
Codein, ⅛ gr., S., 4 or 5 *p.d.*	361
Cubebæ, F., ½ gr., T.H. ..	399
Digestive(Rhei, Zing., Cardam)	
Eucalypti Gum., F. 1 gr. ..	828
Eucalypti Co., F., 1 gr. ..	829
,, Ol. 1 m. G.	
Ferri Redacti, S., 1 gr., 1 or 2	424
Formosyl (G.)	138
Gambir, U.S., 1 gr.—Catechu	
Glycyrrhizæ (et Anisi) ..	832
,, et Opii, ¾ gr.	

NAME. DOSE.	PAGE
Trochisci—*contd.*	
Guaiaci, 2 gr., T.H.F., and S., *Resinæ*, F., 3 gr. ..	454
Gummi Rub. c. Cocaina 1/20(G).	
Hyd. Subchlor. S., ½, 1, 2 gr.	
Ipecac., S., ¼ gr., also F., 1 gr., 2 or 3 *p.d.*	515
Kino, F., 2 gr., 1 *p.r.n.* ..	838
,, *Eucalypti*, 1 gr., F. ..	828
Krameria, 2 gr. et Cocaine, 1–10 gr. G., *p.r.n.*	
Kramériæ, F., Ext., 1 gr., G. 2 gr., F. (T.H.) 3 gr., *et Cocainæ*, 1/20 gr., F. ..	838
Lavandulæ, S., *ad lib.* ..	
Magnesia, 5 gr., S., 2–4 *p.d.*	
Menth. Pip. (et Fort.).	
Menthol, S., ¼ G., 1/20, 1/10, ⅙, ¼ gr.	
,, 1/20, and Cocaine, 1/20 gr., G.	
¼, and Eucalyp., 1 m., G.	
Morphinæ, T., 1/32 gr., 4 or 5 *p.d.*	
,, 1/32 gr., *et Ipecac.*, 1/10 gr. T., 4 or 5 *p.d.* ..	556
,, 1/40 gr., & Emetin, 1/80 gr. S., 4 or 5 *p.d.* ..	515
Nitroglycerini, *vide* Tabellæ.	
Opii, S., Ext. 1/10 gr., 2 to 6 *p.d.*	632
Orthoform, 2 gr., T.H. ..	
Papain, ½ gr., S., and 1/5 gr.	650
,, 1/5 gr., c. Cocaina, 1/10 gr., S.	651
Paregoric, S., 2 to 6 *p.d.*	
Potassii Chloratis, R., 3 gr. (U.S., 2 gr. *p.r.n.*); also F., 3 gri, T.H. ..	697
,, et Boracis, 1½ gr. each T.H.	
,, Chlor. et Glyc. G., 3 gr. *p.r.n.*	
,, Nitratis, S., 3 gr. 3 to 6 *p.d.*	
,, Tart. Acidi, F., 3 gr.	
Pyrethri, F., 1 gr., 3 to 6 *p.d.*	
Rhei, Zingib. et Cardam. ..	
Rosæ, S., *ad libitum.*	
Santonini, S., 1 gr., *h.s.* ..	735
Sedativi, F. 3 to 6 *p.d.* ..	632
Sodii Bicarb., R., 3 gr., *p.c.*	
Sodii et Zingib., S., *p.c.*	
,, Chlorat., 3 gr., 3 to 6 *p.d.*	748
Sulphuris, 4 gr., 1 to 6 *p.d.*	771
Terebene, 1 m., S. ..	
Tolutani S.	
Tussis, 4 or 5 *p.d.*	515
,, Brompton	832
Zingib., S., *ad lib.*	
Tropacocaine HCl.	350
Tropœolin	Vol. II.
Tropic Acids Comps.	225
Trunecek's Serum	743
Trotyl	327
Trypaflavine	312

NAME. DOSE.	PAGE
Trypanosomiasis ..	Vol. II.
Trypan Blue and Red	203
Tryparsamide	224
Trypsin . .. 637, 641 &	V. II.
Trypsogen	639
Tse Tse Fly	Vol. II.
Tubache's Method	335
Tubercle Bacillus .. 917 &	V. II.
Tubercle—Immune Cattle	Vol. II.
Tuberculins	917
Tuberculin 'A.F.'	919
,, Auto-inoculation ..	922
,, 'B.E.,' (Human, Bovine or mixed), 922; Dose Table	923
,, Beraneck's	924
,, Calmette Test . ..	929
,, by Mouth	920
,, Cross Vaccination ..	920
,, Cuti-reaction	928
,, Diagnostic ..	918, 928
,, Dispensaries	926
,, Dose, Table ..	919, 923
,, Dreyer's	925
,, 'For and Against' ..	921
,, 'I.K.'	924
,, Intradermic Test ..	929
,, Koch P.G. 'Old' ..	917
,, Mantoux Test . ..	929
,, Moro's Test	929
,, Nathan Raw	924
,, New (T.R.)	919
,, Ointment (Moro's) ..	929
,, ,, (Phillip) ..	929
,, Old. 917; Diagnost. & Treatment ..	918, 928
,, Ophthalmic Reaction ..	929
,, Original Alt	919
,, Percutaneous Test ..	929
,, Perlsucht, B.E. = Bovine B.E. ..	922
,, P.T. = Tuberculin Old (Bovine)	917
,, P.T.R. = T.R. Bovine ..	920
,, Raw's	924
,, Reactions Diagnostic ..	928
,, "R" (Raw's)	924
,, References, Genl. ..	920
,, Spahlinger's	926
,, Spengler's	924
,, T.A. = T. old	917
,, T.O.A.	919
,, Tables . ..	919, 923
,, Tests	928
,, T.R.	919
,, T.R. Dose Table ..	919
,, ,, *per os.*	920
,, Von Pirquet Reaction	928
Tuberculosis, 914; and Flies .	915
,, And Rainy Winds	Vol. II.
,, Auto-inoculation in ..	922
,, Graduated labour in ..	922
,, Hospitals for Treatment	916
,, Infectivity of 914, *et seq* &	V. II.
,, Lipase Treatment ..	738

NAME. DOSE.	PAGE
Tuberculosis.—*contd.*	
,, And Milk .. .. 915 & V. II.	
,, Notification Order 914, 976	
,, Redhair 915; and in Wales 915	
,, Relation between Human and other .. Vol. II.	
Tubes Témoins . .. Vol. II.	
Tucker's Asthma Cure.. Vol. II.	
Tuffier's Solution = (Stovaine 10% in Saline) 357	
Tung Oil 840	
Tungsten; Arc Light .. Vol. II.	
Turf Moss 758	
Turnera *var.* 826	
Turkey Red Oil 621	
Turmeric C .. .. Vol. II.	
Turnbull's Tinct. Aconiti 1 to 5 m. 109	
Turnsole, V. II.; Turpentine, 685; Punch, 685; Turpeth Minl. 481	
Turpethum, 5 to 20 gr. .. —	
Twilight Sleep 490	
Tylcalsin, 5 to 15 gr., Tablets, 8 gr. 89	
,, Intrav. ½ to 1 Gm. .. 91	
Tyllithin, 5 to 15 gr. 92	
Tylmarin, 5 to 10 gr. (Tabs. and Cachets, 5 gr.) .. 31	
,, Dusting Powder .. 32	
,, Gauze 32	
,, Quinine, 3 to 5 gr. .. 32	
,, Sodium, 5 gr. 32	
,, Thorium 32	
Tylnatrin (Intrav.) use . .. 91	
TylophoræFol,I.C.Add.,¼ to 2 gr.	
Typhoid 929, 976, 1058, & V. II.	
,, Anti, Tablets .. 753	
,, Bacillus .. .. 929 & V. II.	
,, Carriers .. .. Vol. II.	
,, Com. Report 933	
,, Vaccines 930	
,, Widal's Test .. Vol. II.	
Typhol 39	
Typhus Fever .. .. 976 & V. II.	
Tyramine, ½ to ⅓ gr. hyp. .. 419	
Tyrode's Solution 742	
Tyrosin, Tyrotoxicon .. Vol. II.	
Ulexine, 1–20 to 1–5 gr. .. 826	
Ulmus *var.* 864	
Ultra Violet Rays .. Vol. II.	
Ultramicroscope .. Vol. II.	
Uncinariasis, *see* Ankylostom.	
Unguenta 788	
Unguentum, U.S.—Cera Alba 1; Adeps Benz., 4	
Ung. Acid Borici, 1, 2, 3 (Martindale) 13	
,, ,, *Carbol.*, 3% 21	
,, ,, ,, Co. 472	
,, ,, ,, c. Cocaine .. 21	
,, ,, ,, ,, Hyd. Perch. 21	
,, ,, ,, Menthol .. 21	
,, ,, Pheno-Borici. .. 13	
,, ,, Picrici, 1 to 3% .. 75	

NAME. DOSE.	PAGE
Ung. Acid Salicyl, 2% 81	
,, ,, ,, Terebinth .. 80	
,, ,, ,, Co. 81	
,, *Aconitinæ*, 2% 110	
,, Adrenalin 96	
,, Allantoin 863	
,, Allyl Sulphid. 809	
,, Amyl Salicyl Co. .. 79	
,, Anderson 244	
,, Antimonii 181	
,, *Aquæ Rosæ* 847	
,, Argyrol, 187; Aristol .. 500	
,, Arsenii Anserinat . .. 197	
,, *Atropinæ*, ½, 1 and 2% (latter *Off.*) 229	
,, ,, c. Acid Boric .. 229	
,, ,, Cocaina 229	
,, Bals Peruv. 814	
,, Bazin's 481	
,, *Belladonnæ* 239	
,, B. Naphthol Co. 564	
,, Betulæ Co. 691	
,, Bismuth Co. 245	
,, ,, Morph. et Cocain .. 241	
,, Bismuthi Oxychl... .. 245	
,, ,, Subgall. 249	
,, Brilliant Green 330	
,, Cadmii Iodidi, 1 in 8 ..	
,, Calcis Chlorinat. 51	
,, ,, Iodat 64	
,, Cantharidin c. Hyd. Co... 283	
,, *Cantharidini* 283	
,, *Capsici*, and Oleo-res. .. 287	
,, Caseinæ 586	
,, Cedri Atlant. 821	
,, *Cetacei*, 1 in 5 821	
,, *Chaulmoogræ* 608	
,, *Chrysarobini* (& Co.) .. 307	
,, Cinereum 480	
,, *Cocainæ*, 4% 342	
,, Conii. 391	
,, Crédé 188	
,, Creolin Comp. 36	
,, *Creosoti*, 1 in 10; Forte .. 394	
,, Cucum. 825	
,, Cupri Cit. 401	
,, ,, Oleat 602	
,, Cyllin Comp. 36	
,, Demulcens.. 14	
,, Dermatol 249	
,, Desinficiens 476	
,, Diachyli 604	
,, ,, Carbol. 604	
,, Eth. Hyd. Cup. 400	
,, Eucainæ, 10% 351	
,, Eucalypti et Ac. Bor. .. 615	
,, Ferri Persulph. 433	
,, Fuchsin 328	
,, Galeni 847	
,, *Gallæ*, 1 in 5 831	
,, ,, *c. Opio* (7·5%) .. 632	
,, Guaiacol 397	
,, Gynocardiæ 608	
,, *Hamam.* 455	
,, *Hydrarg.* 462	

NAME.	DOSE.	PAGE
Ung. Hydrarg. Dil.	.. ..	462
,, ,, *Ammon.* (Dil. 463)	..	463
,, ,, *Co.*, 2 in 5	.. ..	462
,, ,, et Pot. Iodid.	..	470
,, ,, et Zinci Cy., 1 or 2%		467
,, ,, *Iodidi Rub.*	.. ..	468
,, ,, Mite	.. .. ..	462
,, ,, *Nitrat.*, 471; Dil.	..	471
,, ,, *Oleatis*, 602; Co.	..	603
,, ,, *Ox. Flavi*	.. ..	481
,, ,, ,, ,, c. Atrop.	..	229
,, ,, ,, ,, c. Physostig	..	682
,, ,, ,, *Rubri*	.. ..	482
,, ,, ,, et Canth.	..	283, 482
,, ,, Salicyl-Arsenas	..	463
,, ,, *Subchlor.*	.. ..	480
,, ,, Sulph. Flav.	.. ..	481
,, Hydrog. Peroxid.	..	487
,, Hyoscinæ	.. .. ..	489
,, Ichthyol et Rosatum	..	495
,, *Iodi.* 1 in 25	.. ..	510
,, ,, Denig.	.. ..	511
,, ,, Intinctum	.. ..	511
,, *Iodoformi*	.. .. ..	499
,, ,, c. Atrop.	.. ..	229
,, ,, c. Eucalypto	.. ..	500
,, Iodolysin	.. .. ..	741
,, Iohydrin, 25%	.. ..	513
,, Ipecac. et Crotonis	..	515
,, Kaolin	.. .. ..	155
,, Kaposi	.. .. ..	564
,, Lanæ Hydros	.. ..	111
,, *Lanæ Comp.*	.. ..	111
,, Lano-boric Camph.	..	13
,, Menthol c. Camph.	..	551
,, Metallorum	.. ..	472
,, Methyl Salicyl. Co.	..	79
,, *Myrobalani*, also c. *Opio*	..	827
,, Naphthol Co.	.. ..	564
,, Neapolitanum	.. ..	462
,, Neisser-Siebert	.. ..	476
,, Oleatorum	.. ..	604
,, Olei Cadini et c. Sulph.	..	690
,, Ol. Cedri Atlant	.. ..	821
,, Ol. Ricini Co.	.. ..	621
,, Opii	.. .. ..	632
,, Optochin	.. .. ..	400
,, *Paraffini*	.. .. ..	652
,, Pagenstecher	.. ..	481
,, Para-monochlor-phenol	..	24
,, Pheno-boric.	.. ..	13
,, Physostigminæ	.. ..	681
,, *Picis Liq.*	.. .. ..	690
,, ,, et Acidi Salicyl	..	312
,, Pilocarpinæ	.. ..	533
,, Plumbi Carb.	.. ..	693
,, ,, c. Calamina	.. ..	802
,, ,, Iodidi	.. ..	693
,, Plumbi Oleatis	.. ..	604
,, ,, *Subacetatis*	.. ..	692
,, Populeum	.. .. ..	239
,, Potassæ Sulph.	.. ..	695
,, *Potassii Iodidi*, 1 in 10	..	
,, pro eczema	.. ..	464
,, Prophylaxis	..	463, 479

NAME.	DOSE.	PAGE
Ung. Quininæ (40%)	.. ..	713
,, Quin. HCl. Carbam.	..	717
,, Ranunc. Ficariæ	.. ..	853
,, Reclus	.. .. ..	335
,, *Resinæ*	.. .. ..	853
,, Resorcini (and Co.)	..	731
,, Rubrum, N.H.W.	..	482
,, ,, c. Canth.	.. ..	482
,, Rumicis, 855; Rusci Co.		691
,, Sabinæ	.. .. ..	855
,, Salol c. Cocaina	.. ..	96
,, ,, c. Menthol	.. ..	96
,, Salvas	.. .. ..	745
,, Sawyer	.. .. ..	515
,, Scarlet	.. .. ..	326
,, Simplex	.. .. ..	788
,, Sod. Chlorid.	.. ..	745
,, Sodii Perboratis	..	15
,, Sodii Perox.	.. ..	488
,, *Staphisagriæ*	.. ..	861
,, Stimulans	.. ..	283
,, Stovain c. Adrenalin	..	359
,, Styracis	.. .. ..	861
,, Sulph. Camphorat	..	771
,, *Sulph.*, 771; c. Hyd.	..	771
,, Sulph. Hypochlor.	..	771
,, ,, Iodidi	.. ..	771
,, ,, Naphthol Salicyl.	..	771
,, ,, Zinc. et Kaolin	..	771
,, Suprarenal	.. .. ..	959
,, Thiosinamin	.. ..	740
,, ,, et Antipyrin	..	740
,, Thorii Oleatis	.. ..	782
,, Thymol (& Co.)	.. ..	785
,, Tuberculin Kochi	..	918
,, Uranii Oleat	.. ..	606
,, Veratrinæ, 2%	.. ..	865
,, Whitfield	.. .. ..	81
,, Wilkinson	.. .. ..	771
,, Wilsoni	.. .. ..	800
,, *Zinci*, 15%	.. ..	800
,, ,, c. Acid Salicyl.	..	800
,, *Zinci*, Carbol.	.. ..	800
,, ,, *Oleatis*	.. ..	604
,, ,, Permang.	.. ..	549
,, ,, Peroxidi	.. ..	487
Unicorn Root, False	.. ..	833
University Cream	.. ..	598
Unna's Chaulmoogra Pill	..	610
,, Jelly, 786; Paste	..	801
,, Stain	.. ..	Vol. II.
Unoline	.. .. ..	864
Uradal. 5 to 10 gr.	.. ..	793
Uranin	.. .. ..	673
Uranium, Minerals, Salts., etc		Vol. II.
,, 'X'	.. ..	Vol. II.
Urari, 1/20 to ½ gr.	.. ..	825
Urea, 10 to 60 gr., or more, 789; Estimation of		V. II.
,, Concentration Test	..	789
,, ,, local anaesthetic	..	717
,, Quinine, 5 to 15 gr.	..	717
Urease	.. .. ..	Vol. II.
Ureides	.. ..	789

NAME. DOSE.	PAGE
Ureometers	Vol. II.
Urethane, 10 to 60 gr. ..	796
Urethral Bougies	256
Urginea	864
Urine, Tests for Acetone; Albumin, Blood, Glucose, Uric Acid and Urea Estim., etc. ..	V.II.
Urine, Bromine in, ...	98
Uritone, 5 to 15 gr.	456
Urochrome	Vol. II.
Urodonal, 3 dr. *p.d.*	459
Uroerythrin	Vol. II.
Ura-Hexoids	458
Urohypertensine	419
Uropherin, 5 to 15 gr. ..	779
Urotropine, 5 to 15 gr. ..	456
Ursol	321
Urtica Dioica, 39; Uteramin..	419
Uva Ursi	813
Uviol Light	Vol. II.
Uzara	864
Vaccination Act, 934; Lancets, Shields	935
VACCINES	868
Limit doses are given. Care must be taken to distinguish *Prophylactic* and *Therapeutic Doses.*	
,, Acne, 5 to 500 mill. ..	879
,, Acne, 5 m., with Staph. 100 m. increased ..	880
,, Anthrax ..	871, 880
,, Asthma	881
,, Autogenous	878, 885, 896, 909
,, B. Coli	891
,, ,, ,, in rheum. Arthrites ..	891
,, Bordet Gengou B. ..	937
,, Bronchitis	882
,, Castellani's Tetra-Penta-, etc. . ..	931
,, Catarrh, Nasal, Tracheal.. ..	883 *et seq.*
,, Cerebro-Spinal Meningitis, 50 to 2000 mill.	889
,, Children Doses ..	874
,, Cholera 500 to 2000 m. (Proph.)	889
,, Coli, 5 mill., incr. ..	891
,, Combined Cold 50 to 1000 mill. . ..	883
,, Diphtheriæ 25 to 500 mill.	893
,, Doses of, Table.	874, 877
,, ,, Children.. ..	874
,, Dysentery, 5 to 2000 mill.	894
,, Effects of, Local, etc.	879
,, Friedlander B., 5 to 1000 mill. . ..	884
,, Glanders, 1 Cc.	Vol. II.
,, Gonococcal, 25 to 1000 mill.	895
,, Hay Fever, 5 to 1000 units.	897
,, Hexa (Castellani) ..	931

NAME. DOSE.	PAGE
VACCINES—*contd.*	
Therapeutic Doses.	
,, Immunising Power of.	876
,, Influenza, 10 to 2000 mill. .. .. .. (*c.f.* Combined Cold Vaccine 833.)	898
,, Lymph	934
,, Malta Fever ..	Vol. II.
,, Micrococcus Catarrhalis, 50 to 2000 mill. ..	884
,, Paradonta Strepto., 6 to 10 mill.	906
,, Ozæna, 50 to 1000 mill.	902
,, Penta (Castellani) ..	931
,, Per os. 871, 885, 933,	934
,, Plague	Vol. II.
,, Pneumoccoccal, 10 to 2000 mill., (Prophyl., Wright, 903) ..	903
,, Pollen	897
,, Preparation	875
,, Pulmonary Catarrh ..	882
,, Pyocyaneus B. ..	906
,, Pyorrhœa, 25 m. incr.	906
,, Rabies	Vol. II.
,, Refs., general	877
,, Renner's	934
,, Rheumatic 5 to 1000 m.	907
,, Scarlet Fever, 10 mill. incr.	909
,, Septus B., 50 to 2000 mill.	883
,, Site of Injection ..	878
,, Standardisation ..	875
,, Staphyococcal, 100 mill. incr.	910
,, Streptococcal, 5 to 1000 mill	908
,, ,, Conglomeratus .	909
,, Streptococcal Paradontal 6 to 10 m. ..	906
,, ,, Rheumaticus, 5 to 1000 mill. ..	907
,, 'T.A.B.'	930
,, Table of	874
,, Technique of Injection	878
,, Tetra (Castellani) ..	931
,, Tuberculin *see* Tuberculins	
,, Typh. + paratyph. 50 to 2000 m. ..	930
,, Typhoid, Pas de Calais Expts.	872
,, Varieties of	874
,, Whooping Cough, 5 to 2000 mill.	937
,, ,, ,, Compound	938
VACCINES, DETOXICATED	875, 941
,, Diphtheria	943
,, Gonococcic, 250 to 5000 mill.	896
,, Influenza	902
,, Staphylococcic . ..	942
,, Streptococcic . ..	942

NAME.	DOSE.	PAGE
VACCINES, SENSITIZED		875, 938
,, B. Coli, Cereb. Sp. Fever, Gono., Influenza, Pneumocccus, Staphylo, Alb. Aur. (and mixed), Strepto, and Typhosus	..	939
,, Dysentery (Gibson's)		941
Vaccinia 934 *et seq*		
Vaccinium Myrtillus	.. ..	844
Vacuum Vessels	..	Vol. II.
Vaginal Suppositories	.. ..	442
Valenta Figure	..	Vol. II.
Valentine's Meat Juice	..	577
Valerianæ Rhiz. (et Indic.)	..	797
Valerianic -iso-amyl Ester	..	748
Valerobromine, 2 to 6 dr.	..	798
,, caps., 4 to 12 *p.d.*	..	798
Validol, 10 to 15 m.	.. ..	551
Valkasa	.. ..	45
Vange wtr.	.. ..	Vol. II.
Vanadine, Vanadium	.. ..	864
Vanillin	.. ..	865
Van Swieten's Liquor	.. ..	473
Vapocresolene	.. .. ..	34
Vapor Acidi Carbolici 21; Ac. Carbol. Comp., 395; Allii Succ., 809; Ammon. Chlor., I57; Chlorof Co. 395; Creosoti and Co., 394, 395; Cubebæ c. Limone, 399; Eucalpt. and Co., 615; Guaiacol Co., 397; Iodi Ætherealis, 512; Menthol Citriodor, 551; Terebeni, 777; Thymol	.. .. ..	785
Varalettes, Vol. II.; Varicella		976
Variola, 934 *et seq*, 976; Varium		948
Varnishes, Micro	841 &	Vol. II.
Vaseline (Oil or Liq. 653)	..	652
Vaseline, High Meltg.	.. ..	652
Vaselin Ac. Borici	.. ..	13
,, Atropinæ	.. ..	229
,, Cocainæ, 1 to 10%	..	342
,, Creosoti	.. ..	394
,, Iodof.	.. ..	500
,, Liq.	.. .. ..	653
,, Off. Fr. Cx.	.. ..	652
,, Zinci Ox., 800; c. Amylo		801
Vasenol	.. .. ..	658
Vasoconstrictine	.. ..	960
Vasodilatin	.. .. ..	670
Vasodilâtors, 164, and *see* Therap. Ind.		
Vasogen and Comps.	.. ..	658
Vasotonin	.. .. ..	960
Veal Peptones	.. .. ..	576
Veg. Albumen, 587; Mercury	..	693
Venereal, *see* Gonorrhœa and Syphilis	.. .. ..	
Venereal Diseases Act (1917)		1002
,, Packets	..	Vol. II.
Venice Turps.	.. .. ..	687
Veramon Tabs., 2 or 3	..	337
Veratri Virid. Rad., 1 to 5 gr.		865
Veratrina, 1/64th to 1/16th gr.		865
Veratrinæ Oleatum	.. ..	865
Veratrole	.. ..	865
Veratrone, 1 Cc.	.. ..	865
Verbascum, 865; Verbena, 866; Verdigris	.. .. ..	401
Vermicides, *see* Hydrarg. Ammoniat. and Parasites (Therap. Index) also	.. ..	Vol. II.
Tetrachlorethane	.. ..	306
Trichlorethylene	.. ..	306
Vermijelli	.. .. ..	657
Vermilion	.. .. ..	482
Vermin Killers :—		
Battle's and Butler's contain Strychnine	.. ..	
Hammond's and Simpson's contain Arsenic	.. ..	
Vernisol	.. ..	436
Vernon Harcourt Regulator	..	298
Veronigen, 1 dr.	.. .. ..	793
Veronal, 5 to 10 gr.	..790 &	V. II.
,, Poisoning	.. ..	792
,, Sodium, 5 to 10 gr.	..	793
Veronica *var.* 838; Vervain	..	866
Vesalvine, 5 to 15 gr.	.. ..	456
,, 'B' (Benzoas 5 to 15 gr.)		458
,, Efferv., 1 dr.	.. ..	457
,, 'S' (Salicyl), 5 to 15 gr.		456
VESCETTES	.. .. ..	866
Caffeine Cit. (and Base, 3 gr.)		263
Carlsbad	.. .. ..	754
Lithium Cit., 3, 5 gr.	..	537
,, Hipp., 5 gr.	.. ..	538
Mag. Sulph., 30 gr.	.. ..	542
Piperazine, 5 gr.	.. ..	689
Pot. Chlor., 3 gr.	.. ..	
,, Citrate	.. ..	698
Sodio-Mag. Sulph. et c. Caffeine	.. .. ..	754
Sod. Phosph., 50 gr.	.. ..	751
Sod. Salicyl., 30 gr.	.. ..	85
,, Sulph., 30 gr.	.. ..	
Stront. Brom., 10 gr.	..	762
Vesuvine	.. ..	Vol. II.
Vesipyrin, 15 gr.	.. ..	96
Vet. Surgeon's Scrip for ℞ Drugs	983, *et seq.* &	1001
Vibrion Septique	..	Vol. II.
Vibro Choleræ, 890 & Vol. II.; Vibrona	.. .. ..	544
Viburnum Prunif., and V. Lentago	.. ..	866
Vichy Water	.. 747 &	Vol. II.
Vienna Mixture, 303; Paste	..	695
Vinca Major	.. .. ..	866
Vincent's Angina	.. ..	1060
,, Fusiform B.	.. ..	906
Vinegar	.. .. ..	6
Vin. Antimoniale, 1 to 30 m., emetic, 2 to 4 dr.	..	178
,, Cascaræ, ½ to 1 oz.	..	291
,, Chinæ, 1 to 4 dr.	.. ..	310
,, Cocæ, 2 to 4 dr.	.. ..	338
,, *Colchici*, 10 to 30 m.	..	362

NAME. DOSE.	PAGE
Vin Condurango, ½ to 1 oz. ..	824
,, de l'Hotel-Dieu	410
,, Digitale Comp.	410
,, Diuretic, ½ to 1 oz. ..	837
,, Emetinæ, 5 to 45 m. ..	520
,, Ergotæ, av. 2 dr.	
,, Ferri, 2 dr.	427
,, ,, Amar., 2 dr. ..	428
,, ,, *Citratis*, 1 to 4 dr. ..	
,, ,, Glyceroph., ½ to 2 oz.	44
,, *Ipecacuanhæ* (10 to 30 m. expt.), (4 to 6 dr. emetic)	515
,, Kolæ	266
,, Opii, 10 to 30 m.	632
,, ,, Crocat., 5 to 20 m...	632
,, Pepsinæ, 1 to 2 dr. ..	661
,, *Quininæ*, 4 to 8 dr. ..	713
,, Quinquina Off. Fr. Cx. ..	310
,, Rhei, '85, 1 to 2 dr. ..	
,, Tann-Iodo-Phosph., ½ to 2oz.	506
,, Trousseau	410
Viola *var.*, 30 to 60 gr. ..	866
Violet Gentian	328
,, Crystal.. .. 328,	330
Viper's Bugloss..	827
Virol .. .. ..945 &	V. II.
Viscose, 451; Viscometer	Vol. II.
Viscum Album	866
Visem	45
Vitafer 43,	587
Vitamins .. 589 &	Vol. II.
,, Distribution of ..	589
,, in Strawberry Ether Ext. for Sprue	830
,, Destruction by heat and oxidation ..	590
,, Pasteurising	591
,, Tests for	595
,, Commercial preps. ..	598
,, and imported foods ..	595
Vitamin 'A'	590
and Lipchrome Pigments ..	591
in Cod L. Oil, 591 *et seq.* (c. Lime Salts, 592)	
and Rickets 591	*et seq*
,, ,, contra views ..	593
,, ,, Light in relation..	594
,, ,, ,, MercuryLamps	594
and Dental Caries	594
Vitamin 'B,' Destruction by heat and oxidation ..	595
in Atta	595
in Yeast	595
and Cancer	596
and Lymph Tissue	596
Mode of action	596
(See also Beri Beri, Vol. II.)	
Vitamin 'C,' 596; and Scurvy	596
Tablets (Antiscorb.) ..	596
in Orange Juice (Intrav.) ..	597
Bassett Smith's Tabs. ..	596
Destruction by heat.. ..	597
in Germinating Seeds ..	597
Tomatoes, Tinned and ..	596
Vegetables, Sun dried ..	596
and Pasteurising	597
Vitamin C concentrated to 0·03% of lemon juice. Molecule not larger than that of a hexose. — Drummond, C.D. Sept. 27/24,447.	
Vitamogen	598
Vitex Peduncularis	867
Vitellin, 187; Vitis alta ..	816
Vitmar	598
Vleminckx's Solution	276
Voice Tablets	697
Volckmann's Sol.	785
Vollsalz	700
Volt	Vol. II.
Volumetric Indicators .	Vol. II.
Von Pirquet's Test	928
Walker I. C., Tests	662
Walnut Hair Dye .. 321,	837
War Nephritis, see Nephritis, Therap. Ind.	
Warburg's Tincture, 1 to 4 dr.	726
Warner's Safe Cure ..	Vol. II.
Wassermann's Reaction	Vol. II.
Water Analysis.. ..	Vol. I.
,, Dropwart..	846
,, Gas	Vol. II.
,, Germander	863
,, Glass, 752; Hemlock, 823; London, Magnesium in, Metals in, Mineral, V. II.; Pennywort, 834; Pepper, 850; Poisons in, Vol. II.; Softeners, 7 7 & V. II.; Sterilising Tablets, 753; Sterilising by Chlorine, 51; by Permanganate, 548; Zinc in ..	Vol. II.
Waterproof Shtg.	285
Watkins' Test	Vol. II
Wattle Bark = *Acac. Decurrens*	804
Wax, Bees, 821; Carnauba	Vol. II.
Wax, Horsley's..	821
Waxes, M.Pts. of ..	Vol. II.
Weights and Measures.. ..	xxx
,, Atomic	..xxviii
Weil's Disease	Vol. II.
Westoran	306
Westron	306
Westropol	306
West's Swab	887
Whatmough's Iodine Ampoules	508
Wheat and Germ ..	Vol. II.
Phosphates, Sacch.	679
Whey Powder, 585; Whiskey	127
White Precipitate	463
Whitehead's Varnish	499
Whitfield's Ointment	81
Whooping Cough, Therap. Ind. 1061; Bacillus, Vol. II.; Infective Period, 976; Vaccine	937
Whortleberry	844
Widal's Reaction ..	Vol. II.

NAME. DOSE.	PAGE
Willcox on Arsenobenzol Doses	208
Wilkinson on Tub. Treatment	926
Williams' Pink Pills ..	Vol. II.
Willmore on Dysentery ..	523
Willow, Black or Pussy ..	855
Willowcine	864
Wilson's, Erasmus—Hair Lotion and Oint.	160, 283
Winslow's Syrup ..	Vol. II.
Wintergreen Oil, 5 to 15 m. ..	79
Witch Hazell	454
Witwatersrand Report ..	903
Wonderberry	859
Wood Naphtha..	128
,, Oil, ½ to 2 dr., 814; Spirit, 128; Poisoning..	128
Woodward's Gripe Water ..	V. II.
Wool Absorbent, 449; Animal, 448; Blue, 477; Carbolic 19; Cyanide, 467; Fat, 111; Lamb's, 448; Mercuric Iodide, 468; Non-Absorbent, 449; Perchloride, 476; Picric, 75; Salicyl, 81; Styptic	426
Worms	734, 1061
Wormseed (Levant)	734
Wormwood	804
Wortabel Treatment	177
Woulf's Bottle for Oxygen ..	635
Wound Sucking	871
Wound Treatment	1062
Wourara, 1/20th to ½ gr. ..	825
Wright, Sir A. E. on Pneumo-Vaccines	903 & Vol. II.
,, Hypertonic Saline ..	743
,, Leishman Stain, Pipette, Pneumo. Culture Med.	Vol. II.
,, Rand Report	903
,, Sod. Cit. Solution ..	749
Wrightia Antidys.	834
Wright's Coal Tar Preps. ..	312
Wyeth's Meat Juice, ½ to 1 dr.	577

Xanthaline	Vol. II.
Xanthine	262
Xanthium Macrocarpum ..	761
Xanthoxylum	867
,, Senegalense.. ..	867
Xeroform, 5 to 20 gr., 23; Gauze	24
X.L. All Fumigators	846
"X" Rays	Vol. II.
,, Bismuth Meals ..	240, 244
,, Wax	Vol. II.
Xykol	39
Xylene, 325; Xylonite, 366; Xylol, 325; Xylol Balsam	Vol. II.
Xylol-azo-β.Naphthol Sulphonate	326
,, azo-Xylol-azo-β Naph. Sulph...	326

Yadil	139
Yatren	328, 524
Young's Dose Table	1068
Yaws	207 & Vol. II.
Yeast, ½ to 1 oz., Extracts ..	292
,, Vitamin 'B' in.. ..	595
Yellow, Aniline, Vol. II.; Fever	Vol. II.
,, Ointment..	481
Yeo's Mist. Anti-Catarrh., 1½ozs.	161
,, ,, Chloric. Quin., 1 oz.	724
Yerba (Maté)	266
,, Santa	867
Yersin's Serum.. ..	Vol. II.
Yew, 863; Yoghourt, *see* Curdled Milk..	70
Yohimbine HCl., 1/20th to 3/20 gr.	867
Yohimba var.	867
Yperite	1064

Zam Buk	Vol. II.
Zambeletti's Iron & Arsenic Drops, 5 drops ..	196
,, Injections, 5 to 10 m...	196
Zea Mays, 841; Zedoary ..	726
Ziehl-Neelsen's Stain ..	Vol. II.
Zinc & Starch Powders, 801; Arsenic Free.. ..	799
,, Chloride Solution	779, 979
,, Cream, 800; Gelatin ..	801
,, Ionisation ..	Vol. II.
,, Pastes, Various	801
,, Points	803
,, *Acetas*, 1 to 2 gr. ..	799
,, Benzoas	799
,, Bromid., 2 to 5 gr. ..	799
,, *Carbonas*	799
,, *Chloridum*	799
,, Citras, 3 to 12 gr. ..	800
,, Cyanidum..	800
,, et Hyd. Cyanid. . ..	466
,, Iodas	65
,, Iodidum, av. 1 gr. ..	800
,, Lactas, ½ to 3 gr. ..	800
,, Margosas	814
,, Oleas	604
,, *Oleo-Stearas*	604
,, *Oxidum* (Dusting Powders, 801), 3 to 10 gr. ..	800
,, Oxychlor...	802
,, Oxyphosph.	802
,, Oxysulph.	802
,, Permang...	549 & Vol. II.
,, Peroxid.	487
,, Phenol-para-sulphonas ..	22
,, Phosphid., 1/20th to 1/3rd gr.	677
,, et Potass. Cy., $\frac{1}{10}$ to 1 gr.	800
,, Salicyl., 1 to 5 gr. ..	802
,, Silicas (=Willemite)	Vol. II.
,, Stearas	803
,, Sulphanilas	321

NAME.	DOSE.	PAGE
Zinc Sulphas.,	1 to 3 gr. tonic, 10 to 30 gr. emetic, 802; Spray in C.S. Fever	803
,, Sulphate Uterine Points.		803
,, Sulphide "Active"		Vol. II.
,, Sulphocarbolas		22
,, Sulpho-ichthyolat ..		495
,, Tannas		107
Zinc Valerianas,	1 to 3 gr. ..	798
Zingiber,	5 to 15 gr.	868
Zirconia		Vol. II.
Zittmann's Decoctions		.. 856
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